

100% Australian content

FIRST TAKE

Pentium III PCs:

First releases from Gateway and Beyond

Satnet: Satellite Internet is here and it's fast

Canon BJC-7000 and Epson Stylus Color 900:

Two of the best-ever printers

AutoCAD 2000

Solaris 7/Intel

Dragon NaturallySpeaking

Laplink Professional

WORKSHOP

- Technobabble: Networking protocols
- Step by Step: Get more from digital cameras
- Windows 98 Update
- Linux clockwatching
- o Programming: C++ and Java
- Plus OS/2, Mac, Shareware and much more

On this month's software-packed CDs

- Swat the millennium bug with our Y2K fix kit
- Corel WordPerfect 8 for Linux: 100M+ of files
- Give your PC a facelift with our desktop dressing toolkit
- Build a business: Set up an intranet/extranet using DIY groupware
- DIY groupware: All the tools to share your company's resources and information across an intranet, an extranet and the Internet

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TRIPLE CD EXTRAVAGANZA: Y2K FIX KIT * PERSONALISE YOUR DESKTOP BUILD AN INTRANET * COREL WP FOR LINUX ustralian

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method Fix it now

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10 budget scanners 16 monitors: 19in and 21in

Build an intranet/extranet

Notes/Domino, Exchange and GroupWise



apcmag.cd

ODISC 1

NEW & HOT

EmailFerret 1.51, Icoholics Anonymous 4.b, ICQ Backup 2.6, Infradig Personal Server 1.27, Nendo 1.1, RightClick-MP3 1.51, Telnet98 3.0, JS Office 1.5, eCatch 2.1, EZSurfer99 5.1

WORKSHOP

Windows: BiblePro 6.0, Theophilos 2.6, Pagan DayBook II 4.0b, Virtual Rosary 3.5, Prayer Times 4.0, Crucifixion Theme

OS/2: PMView, Albatros Media Player 2.0b6, QuickMotion 2.0, Embellish 2.01, MainActor 1.5 Mac: Uli's Moose 2.0 and Phrase Editor 2.2, DeskBots 1.6, Kineticon 1.4, MyEyes 2.3.2, Yo! 1.0, Kaleidoscope 2.1.1 Linux: Postilon, Ace of Penguins, Code Crusader, GQ, Stamp

Windows Workshop files: Microsoft Office Service Pack 1 & 2, Word 97 Template Security Patch Other Workshop files: Mac OS files, Java files, C++ files

BANDWIDTH BUSTERS

Corel WordPerfect for Linux

GAMEZONE

Baseball Edition 2000, Virtual Deep Sea Fishing, Virtual Tennis, Imperialism II: Age of Exploration, Pro Pilot 99

BROWSERS

Microsoft IE 4.01 SP1, Microsoft Internet Explorer 4.0, Microsoft IE 3.03, Netscape Communicator 4.5, Netscape Communicator 4.08, Netscape Navigator 4.08

DISC 2

DESKTOP ADD-ONS

3D Color Changer 98, Bali Tools, DeskTop Auto-Rebuilder, Desktop Goodies 5.0, Drag and View 95, EjectMenu, Encrypted Magic Folders, Extensions Strip, FastView Plus, File Splitter Deluxe, FinderPop, GTI Desktop+ 2.0, iView Multimedia, QuickSpell 1.1.0, TweakExplorer, Tweaki for Power Users, WindowPictures 1.1, WinNavigator, WrapUp 2.2, Xfolder, X-it 2.51

CURSORS

Axialis AX-Cursors, All the Trek Cursors 1.0, Coca-Cola Cursor Set 1.1, Enterprise Mouse Cursors 1.0, Froggie Hopper Animated Cursor Set 1.0, Homers Hair 4.0, Karin's Kow Animated Cursor Set 1.0, Kitten Caboodle Animated Cursor Set 1.0, Macintosh Cursors 1.0, Morphing Cursers 1.0, Murray Mouse Cursor Set 1.0, Mute Jump Cursor 1.5, Neil Pryde Animated Cursors 1.0, NHL Cursors 1.0, Real3Dcursors 2.0, Real3Dpointers 2.0, SportyMouse! Cursor Set 1.0a, Star Wars Cursors 1.0, Ted E. Bear Animated Cursor Set 1.0, Tumi's 3D Gravity 1.0, Tumi's 3D Tools 1.0, X-Files Cursor Set 1.1

SCREENSAVERS

3D Museum, AC/DC, Alien Resurrection, All Space, Antz, Aquatica, Australian Bush Flowers, Bacardi Cuba Libre, Bare Naked Ladies, Bible Verses and Inspirations, Big Cats, Bill's Pie Toss, Blaze, BMW Z3, Budweiser Frogs, Bundaberg Rum, Cayman Islands Underwater, Coca Cola, Dancing Baby 2, Denver Broncos (Swan Lake), Doctor Who, Earth, Electricl, Forrest Gump, Fractopia, Garfield's Midnight Snack, Giorgio Armani, Guinness

Beer, HP Mopy Fish, Impressionist Paintings, Jack Daniels, Johnny Castaway, Jokes, M&Ms, Madonna, Millenium Countdown, Princess Diana Tribute, Sports Illustrated Swimsuit 99, Starcraft, Success Quotes, Sydney Swans, Tasmanian Devil, Teletubbies, The Clinton Blues Satire, Titanic, Truman Show, Turkey Shoot, UFO Photos 1942-1998, V8 Supercars, Waterfalls

SOUND TOOLS

AudioCD MP3 Studio by PTS-Software 1.1a, Albatros CD Player 2.0, Audiograbber, Audiotools 2.2, Cakewalk Pro Audio 8.0, CD Magic, Cowon Jet-Audio, Desktop Jukebox 2.1, Dj MP3 Gold, Dublt 1.01, FreeAmp, FreeMidi, MacAmp, Mpecker Encoder 1.0b13, Musicmatch Jukebox 3.0, PlayerPro, PMCD2WAV, Sonique 0.75 beta, Sound Studio for Linux, WillowTALK, WinDAC, X11Amp

WALLPAPER TOOLS

All Space Wallpaper Manager 1.0, Amazing Desktop Wallpaper Manager 1.0, WallChanger 2.1, Wallpaper Changer 1.0, Wallpaper Randomizer 1.0

GAMEZONE

3D BlackJack & Trainer 1.0, 3D Ten Thousand 1.01, 3Dt 1.1, Ancient Ivory 3.5, BVS Solitaire Collection 2.2, DiceDeluxe 1.0, Dizzy Just Another Yamb 2.1, Double Patience 1.10, Kutris 1.0, Midnight Sunitaire 2.02, Net Gin Rummy 3.01, Net Poker 3.01, NetJazzy Version Beta 599, netris32 2.5, Pretty Good Solitaire 98 4.98.2, Super Poker 1999 5.0, Wild Snake 1.0, WinTetris 3, Yatzy-Mega-Giga 1.0, Yo'Dice 2.1

ODISC 3

DIY GROUPWARE

Apache HTTP Web Server for Linux, Cold Fusion 4.0, CU-SeeMe, Domino Web Server Gold, GLACI-HTTPD Web Server for Novell 3.14, iCal Web Calender 2.3, Infradig-MAIL Personal Edition, Internet Anywhere Small Business Connect 2.1, I-Queue Server for Windows 95, IRCPlus 1.1, Mdaemon 2.75, Net Schedule Pro 1.0, Lotus Notes R5 Build 164.1, Radio Chat Server 3.73, SiteForum, SMTPBeamer 3.07, TeamWave Workplace 4.1, TU-CyberFone, VCI IntraNote Server 1.1, WebBoard 3.0, WircSrv 5.07

Y2K

Adapt/PC-2000 1.02, AllClear 2000 Pro 2.7e, BugFix 2000 2.0, Centennial 2000, Centurion Year 2000 Test 1.0, ClokTest 2000 3.331, Date Detective 4.0, DateHound 1.12, MFX2000, Microsoft Virtual Machine Update, Microsoft Windows NT Server 4.0 SP 4 Y2K compliance Service Update Norton 2000, OnMark 2000 3.0, PC Life 2000 3.0.2, Quick Consultant: Survey and Questionnaire Software (Year 2000) 1.2a, Uh-Oh 1.0, Windows 95 Year 2000 Update, Windows 98 Year 2000 Update, Y2K Coutdown Program, Y2K Test&Fix 1.10, Year 2000 Countdown Screen Saver

BANDWIDTH BUSTERS

Lotus Notes R5 Build 164.1

GAMEZONE

Lander, Machines, NASCAR Racing 3 Movie, Pro Pinball: Big Race USA, Rollcage, Roller Coaster Tycoon



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Pentium III PCs:

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and Beyond

Satnet: Satellite Internet is

here and it's fast

Canon BJC-7000 and Epson

Stylus Color 900:

Two of the best-ever printers

AutoCAD 2000

Solaris 7/Intel

Dragon NaturallySpeaking

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Technobabble: Networking protocols

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- Linux clockwatching
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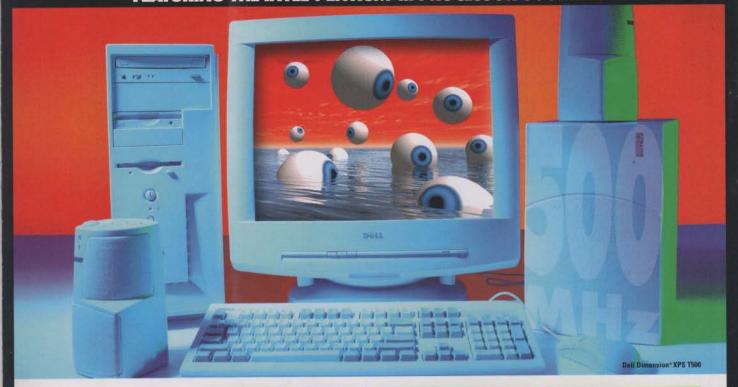
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- Microsoft* Windows* 98
- . NEW Microsoft® OEM Works Suite 99
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- 32X Variable EIDE CD-ROM Drive
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- Upgrade options include
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- · Mini Tower Chassis
- 3.5" 1.44MB Diskette Drive

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- . 512KB Single Bank Pipeline Burst Cache
- 128MB 100MHz SDRAM . 8.4GB Ultra ATA Hard Drive
- . 3Com* 10/100 TXM PCI Ethernet Controller
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- · Yamaha 64 Voice Wavetable Integrated Sound
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- . New Microsoft® Office 97 Small Business Edition

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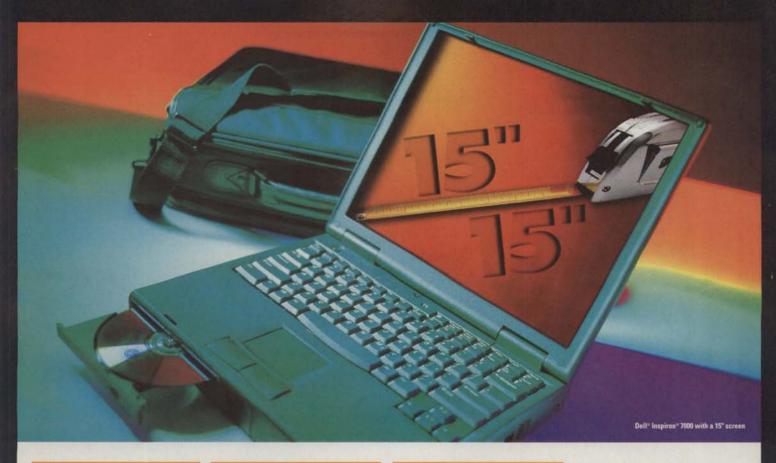


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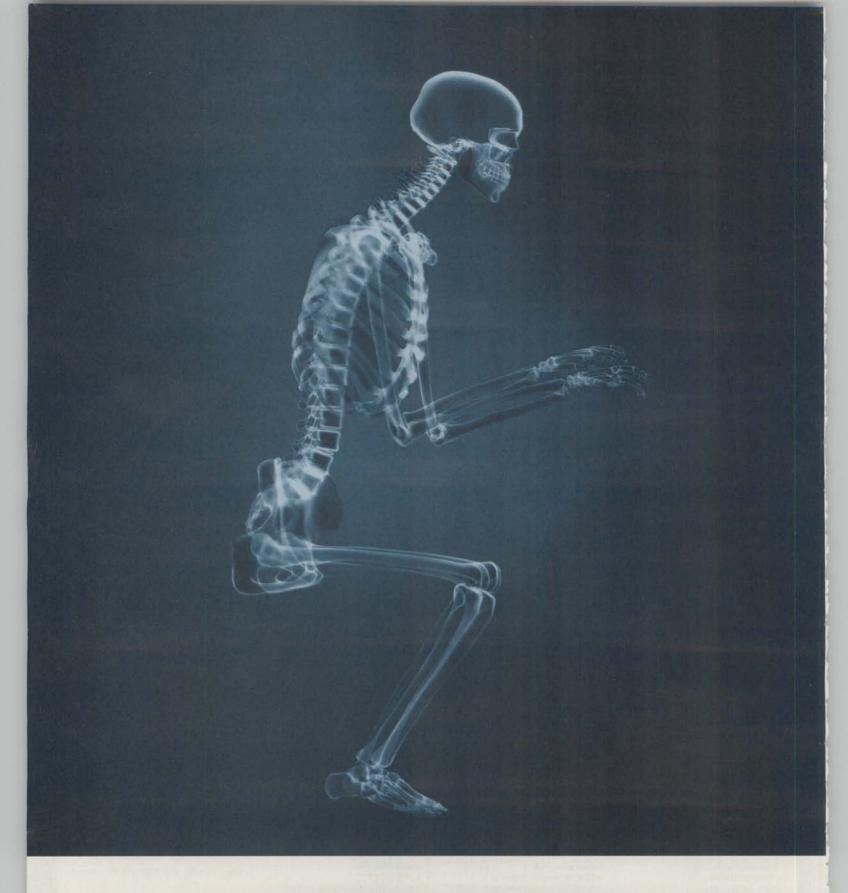
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Editorial



Introversions

Why we need your feedback in this month's reader survey.

By Jeremy White



s a magazine we try not to be too introverted or self-obsessed. So while many magazines use the editorial page to give you a

snapshot of what's in the issue or why the magazine is worth your time, in most issues of *APC*, this page is used to discuss technology and its impact on our lives and work.

Periodically, however, we believe it's important to update readers on what the magazine is doing, especially when there are major changes in the pipeline or under consideration. We aim to be a very reader-driven magazine, and sometimes we like to find out what our readers think we're doing and how we can improve. Sometimes we just want to say thank you for your support.

This month I'd like to do a little bit of all of the above.

First of all, I'd like to say thank you. Without a committed and supportive readership, any magazine is dead in the water. I've been at the helm of APC for just over four years and the most satisfying part of my job has been the feedback, guidance and support we've received from our readership. That support has not just manifested itself in significant circulation and readership growth, but it has also driven many of the innovations the magazine has embarked upon.

According to the latest audited circulation figures from the Audit Bureau of Circulations, the magazine now sells on average more than 72,000 copies every issue — more than twice what it sold a few years ago. It's been the fastest growing magazine in the country over the last 10 years. Our hottest issues now sell in the mid to high 80s. And according to Roy Morgan Research, more than 300,000 people now read the magazine every month.

Of course, for the last two and a half years APC has been much more than just a magazine on the newsstand. Between 450,000 and 500,000 people use apcmag.com every month. And we believe that over 98% of our readers regularly use our pioneering apcmag.cds. We've also had phenomenal support for our new Pocketbooks. The Linux Pocketbook now appears to have sold out of its second print run, and there has been strong weekly growth for our weekly magazine on CD, CD Week. Meanwhile our new dedicated Australian IT news service Newswire (http://newswire.com.au/) has quickly become essential reading for serious IT news readers and the IT industry.

But most powerful of all is the mountain of individual feedback we receive from readers in a vast array of forms — everything from long emails discussing articles or ideas, through to suggestions on topics to cover. We also receive numerous requests for back issues and even reports of broken CDs or subscription copies folded in the post.

Every time a reader contacts us is an opportunity to improve the magazine — in a microscopic or macroscopic fashion — and we've tried hard to encourage feedback. This has its drawbacks, of course. I'm way behind in answering the reams of emails I've been sent. It sometimes takes longer than we think to ship out products readers have requested.

We know too from all of this feedback that it is essential to keep changing and improving. We operate in a fiercely competitive magazine market.

We know we are up against much cheaper competitors, competitors that rehash overseas editorial content and haven't made the kind of investment in 100% Australian content, meta-media publishing, staffing, technical resources or innovation that we have.

However, we also know from experience on the newsstands and from our ongoing surveys that the answer to these competitive forces is not to drop the quality, drop the expensive Web and CD content, or slash the cover price on the monthly magazine.

Readers have consistently told us in surveys and in voting with their wallets that the quality and value are more important than low price. APC always sells best when it offers more value and real innovation, rather than cutting the content and dropping the price. In surveys, the vast majority of readers say that they are prepared to pay a higher price for more and better content and resources, like extra CDs, or the Web content.

But we know that to justify the higher price, clearly we have to offer far and away better value for our readers' dollars. This is our focus in the coming months - to keep making APC clearly better value to readers - with the best writing, the most interesting analysis, the most credible recommendations and reviews, and the most useful resources. We're also working on ways to make the magazine more usable, so that it's easier to organise back issues and CDs, and find the content you're looking for from a particular issue more easily. We also have some major online developments in the pipeline.

We need your help, though, in improving the magazine. And this is why I really do implore you to take the time to fill out the detailed reader survey this month. There's a cut-down version on paper in this issue, but we'd really encourage you to tell us what you think in detail, and fill out the more detailed version available at http://apcmag.com/surveys/survey99.

Ultimately, the magazine belongs to you. So please tell us what you think of it and how we can do better.



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PIII goodness: What does it mean?

Intel's new Pentium III microprocessor — formerly known as 'Katmai' — was officially released at the end of February. Until then performance details were relatively scarce, forcing us to rely on oblique references from Intel marketing types about something called "Katmai goodness".

Thankfully we've moved on from there. As outlined in the technical feature starting on **page 95** of this issue, the real winners with the new processor are game players. The PIII (and its 70 new instructions) has the potential to do a lot for 3D performance, offering the chance for better graphics, artificial intelligence and physics engines designed to make 3D games much more compelling. Also discussed is the controversial serial number.

For those interested in test results, turn to **page 32** to see how a couple of new PIII-based machines fared against both each other and a PII-based system.

APC SURVEY

**

Reader Survey 1999

For your chance to win a Brother MFC-7160C Colour Multi-function Centre valued at \$1,099, fill in our 1999 Reader Survey on page 191 or online at apcmag.com/ survey/survey99/.

There are also 10 runner-up prizes of a one-year subscription to APC. Entries close at midnight on April 30. The results will be published in APC July 1999.



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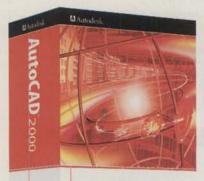


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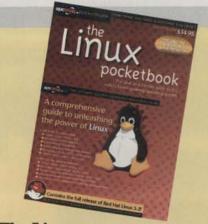
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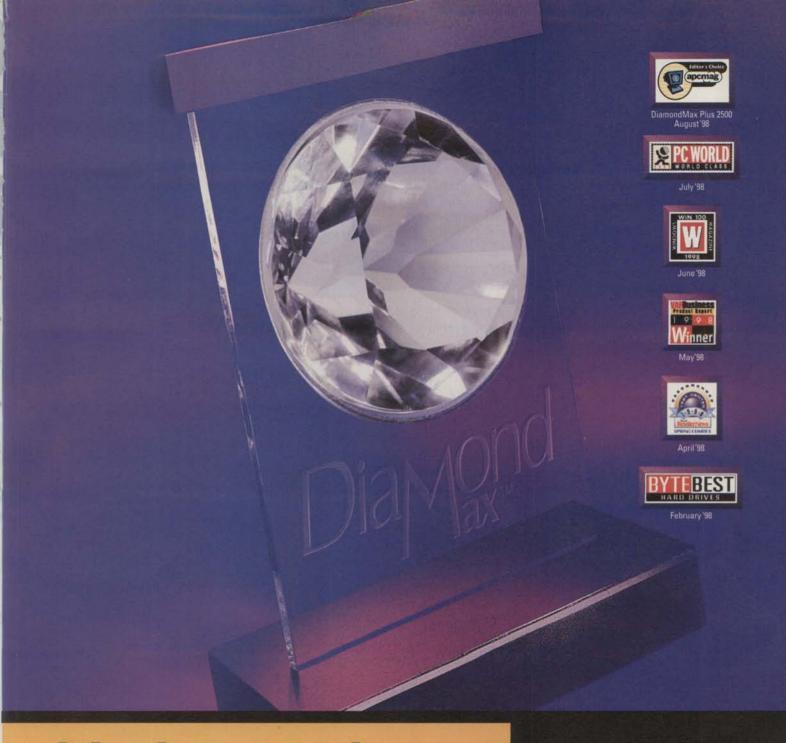
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It's that good.

Well, better actually. DiamondMax hard drives from Maxtor are getting kudos from all over the world. The latest addition to our trophy cabinet is APC mag's "Editor's Choice" award. They said our 10 GB DiamondMax Plus 2500 hard drive, "Outpaced the competition, and with its superior rotational speed at 7200 RPM and its large capacity, gave top performance at a reasonable price." Add in seek times as low as 9ms and our 3 year RTB distributor warranty and then compare. Hey, it just doesn't get any better. Maxtor. It's that simple.



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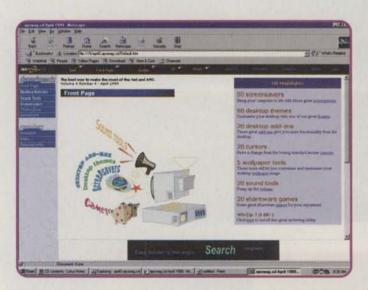
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Coming up

- Reviews: When it comes to reviews, our May issue will be an Internet special, as the APC Labs team test 25 ISPs and a stack of V.90 external modems. Find out how to get the best Internet experience possible by choosing the right ISP and modem.
- Will technology help revive regional and remote Australia? There's no doubt that rural areas have been hit hard by a longterm decline in their economic bases. However, Australia's vast distances and isolated rural areas may no longer continue to pose problems. Selina Mitchell looks at whether the Internet will provide all its users with an equal chance at social and economic success.
- Technical: We'll analyse developments in memory technology and the impact on users, and Web server farms — installations used to host multiple sites which feature high security, automatic failover, built-in cooling systems, generators and so on.

All this plus news, views, CDs and more in May APC, on sale April 22.

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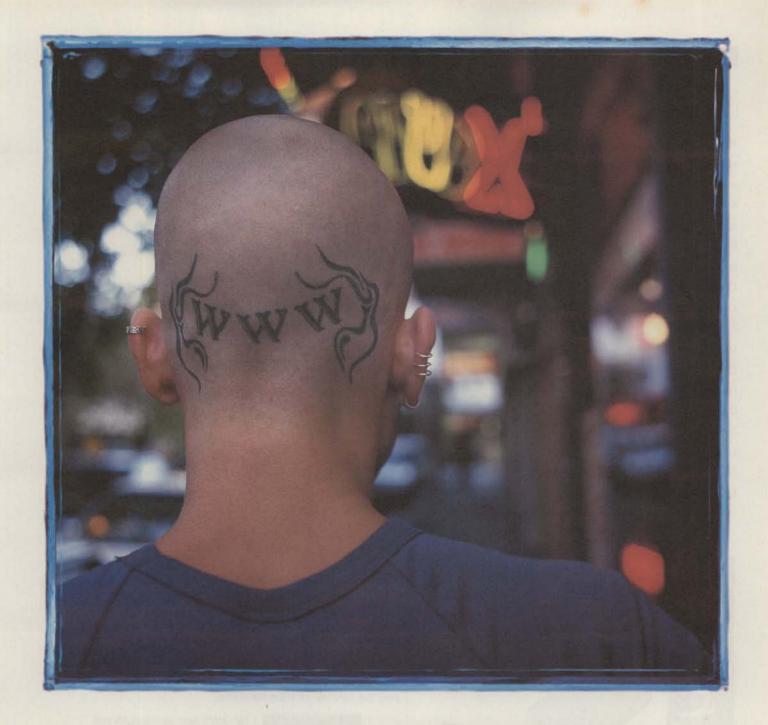
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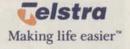
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MORE, MORE, MORE

90 million PCs and counting

Global PC sales topped 90 million units in 1998, with sales in the US and Europe offsetting market declines in the troubled Asian region.

Industry research firms IDC and Dataquest both issued their sales estimates for the year in late February. Dataquest (a division of Gartner Group) estimated total sales at 92.9 million. IDC posted a slightly more conservative estimate of 89.9 million.

The two firms also agreed on the rankings of the top five sellers. Compaq took top position with 13.8% of total sales, followed by IBM, Dell, Hewlett-Packard and Packard Bell NEC. Of the five major players, Dell had the largest increase in sales; its 7.9% of sales is now just shy of IBM's 8.2%.

The US preference for direct marketing of PCs - a trend Dell is now replicating worldwide - saw Gateway take third place in the US rankings. The fact that this was not enough to put it into the global top five indicates the increasing importance of non-US figures to global sales

Continued on page 18

BUY, SELL, SPLIT, ACQUIRE

Tech business in top gear

here was a time when the technology business paid more attention to technology than business, but continued frenetic stock market interest in IT and a perception of wealth in the making has led many local businesses to pay as much attention to fundraising activities as product development. Recent events, however, show that attempts to make your next million from savvy tech business dealings aren't always successful.

For some firms, listing on the stock market proves to be an easy precursor to wealth. Local Internet media company LibertyOne is looking to exploit its continued success on the Australian Stock Exchange (ASX) with a 4:1 share split. LibertyOne floated in December last year with an initial issue of 20 million shares. which represented 25% of the company. The shares have since skyrocketed in value; they closed on the first day at \$3.06 after opening at \$2, and have gone above \$4.40 since. LibertyOne also plans to take advantage of the US mania for Net stocks by establishing an

Can't help ourselves

IN OTHER MAJOR TECH BUSINESS DEVELOPMENTS THIS MONTH:

Online firms in float frenzy. Both the ABC and PBL are planning to float their online businesses. Page 22

Game for a merger? Two of Australia's most prominent games companies have become takeover targets. Page 26

Bourseware. Will Net investors learn from the lessons of history before the bubble bursts? Page 67

For up-to-the-minute business and finance news, see http:/newswire.com.au/cashbook/

American depository receipt (ADR) program to allow its shares to trade overseas.

Other listed companies are also sharing their wealth. Niche telco Davnet has announced that it will pay about \$12 million to acquire veteran ISP Magna Data. Magna Data will continue operating as a separate company following the deal. The ISP has revenues of \$8 million and an annual profit of about \$1 million, officials said. Rumours of an impending deal with Davnet circulated in the industry for some time, although Magna Data officials denied that a deal was in the offing only a week before the merger.

Others, though, have had a tougher time selling their merits as potential acquirers. After a prolonged saga, local accounting firm Solution 6 was forced to withdraw a merger offer to Canadian legal practice management software vendor PC DOCS. Solution 6 had proposed a capital share swap of 4.35 Solution 6 shares for every PC DOCS share, valuing the combined company at about \$250 million.

PC DOCS, which had already turned down a private merger proposal, rejected the offer, describing it as closer to a takeover of Solution 6 by PC DOCS than a merger.

Continued on page 18



This month on Newswire!

The Newswire Web site is continuing to grow as more technology users discover Australia's premier IT news service. We'd like to thank you for your support, and the many helpful feedback emails you've sent.

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AUSTRALIA'S TECHNOLOGY NEWS

1998 handheld sales MARKET GROWTH SHIPMENTS SHARE (%) (THOUSANDS OF UNITS) 1,600 3Com 40.1 57.1 Sharp 828 20.8 67.4 Psion 519 13 30.9 Hewlett-Packard 270 6.8 12.1 150.4 Philips Mobile 4.4 177 NEC 170 4.3 1.004.5 424 80.9 Others 10.6 3.988 100 61.4 Total Source: Dataquest

90 million PCs and counting

Continued from page 17

tallies. The US now accounts for under 40% of the world's total PC sales.

Australia, India and China led the increase in PC shipments for the Asia-Pacific region in the fourth quarter of last year. Preliminary findings from IDC found PC shipments in the region were up 7% to 2.89 million units in the fourth quarter of 1998.

The biggest increase last year came from India, which was up 31.5% to 776,000 units. China was close behind, up 29.5%, and it accounted for the most units shipped in the region in 1998, 3.9 million. Australia also had a strong showing; it was up almost 12% to 1.7 million PCs.

IDC listed Compaq/Digital, IBM, Legend, Hewlett-Packard and Acer as the top five vendors in the Asia-Pacific region. Legend, a relatively unknown name in Australia, was the dominant brand in the Chinese PC market.

In other market figures released by Gartner Group, Apple reclaimed the number five spot in the Australian market. Compaq led the field on 13.7% (down from the last survey), followed by IBM, Hewlett-Packard and Dell. In total, 1.909 million units

shipped in Australia in 1998, according to Gartner Group, slightly less than the anticipated figure of 2 million.

Handheld heaven

While PC sales continue to dominate, handheld devices are also continuing to grow at a phenomenal rate. Almost 4 million units shipped worldwide in 1998, an increase of 61.4% over the previous year (see table above).

According to Dataquest, 3Com led the way in shipments — its PalmPilot accounting for 1.6 million of the total units shipped, and a dominant 40.1% market share. Sharp came in second, with 828,000 units (20.8% share).

Dataquest found the Palm operating system — used on the 3Com PalmPilot and also licensed to other companies, including IBM — was the dominant OS, followed by Windows CE (25%) and EPOC32 (13%).

However, the news wasn't so good in the high-performance sector. Silicon Graphics' poor performance has resulted in a dramatic slow-down in the worldwide market for high-performance computers in 1998.

Roulla Yiacoumi and William Maher

Tech business in top gear

Continued from page 17

Solution 6 general manager of global sales and marketing, Richard McLean, told APC that the company was disappointed by PC DOCS' decision. "We're confident that the synergies between the two companies are compelling," said McLean. "If the proposal had been brought to an offer, we're sure there would have been long-term value for the shareholders of both companies."

Other takeover offers also took some time to push through. MCI WorldCom's plan to take over ISP OzEmail faltered when it failed to reach a required 75% acceptance level by the deadline of its initial offer. An extension to February 24 eventually saw the telco reach the required numbers.

There was an equally epic saga involved in selling off Internet service provider Connect. Several companies had hoped to take it over, but AAPT Telecommunications emerged as the victor. The investment arm of the National Australia Bank.

National Australian Investment Capital Limited (NAICL), sold its 41.13% investment in Connect to AAPT for \$18.3 million, and modem manufacturer Sirius offloaded its 17.7% shareholding to AAPT for a sum exceeding \$4 million.

Connect will now operate as a wholly owned subsidiary of AAPT. "When coupled with AAPT's rollout of CBD fibre and other infrastructure-based initiatives, the full acquisition of Connect makes compelling sense," said CEO Larry Williams. "Many people have wanted to purchase Connect - Australia's third-largest ISP however, under the total control of AAPT it will capture the full value of the convergence of telephony, data and video which leads to multimedia."

Sirius had hoped to sell its 17.7% stake to US Internet service provider PSINet, but that deal fell through after an agreement with AAPT could not be reached.

Angus Kidman, Josh Gliddon, William Maher and Roulla Yiacoumi

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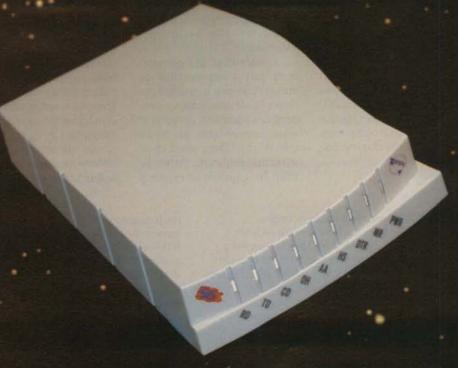
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OZ INNOVATION

Squeezing the light fantastic

magine a parade of soldiers marching in lockstep, moving in the same direction at the same speed. In their matching uniforms, they look like a homogenous entity.

But if you took a closer look, you would notice that not all the soldiers are of the same height and that their arm movements aren't always in sync. The parade still looks neat, clean and tidy, and the sergeant at arms is probably pleased, but things could still be better.

Laser light, with its uniform wavelengths, is a lot like the parade of soldiers, but instead of varying heights and out-of-sync arms, it has static and background noise.

Low-power, low-performance applications such as CD players aren't really bothered by this photonic crackle and hiss because they're reading from a relatively low-density medium. It's the high performance stuff, like long-distance fibre-optic communications, that suffers from reduced range and density due to noise.

A research group led by Professor Hans-Albert Bachor at the Australian National University (ANU) in Canberra has taken a massive step towards reducing the noise in laser light with the development of what's been dubbed 'squeezed light'.

Squeezed light uses a specially developed crystal to break the laser into two quantum-correlated beams. By subtracting the beams from one another, the overall level of noise and the magnitude of frequency fluctuations within the laser beam are reduced.

Bachor said that his team has managed to reduce the level of noise by a factor of four. In theory, this should mean that communications cable should be able to carry four times more information, or that a laser writing to a suitable optical media would be able to achieve a 400% improvement in the density of information written.

Although the current squeezed-light laser is large enough to fit on a benchtop, Bachor anticipates that commercial versions, with form factors similar to current lasers, could be developed within four years. The ANU team is currently in negotiation with several companies interested in developing the technology.

Josh Gliddon

NET GAIN

Online trade beckons for Oz

Internet commerce is expected to equal the size of the whole Australian economy by 2001, making the development of an online trade strategy a major priority, according to a new Federal Government report.

he value of global

The report, Driving Forces on the New Silk Road, examines the growth of the Internet and its implications for Australia's trade strategy.

As with other areas of electronic commerce, the report suggests the role of government should be to support private enterprise in the development of services. "The private sector has a clear role to play in developing online opportunities and using the Internet to advance offline trading interests," the report states. "This is fundamental: governments must give business room to respond to the opportunities and challenges presented by Internet commerce."

It adds that the government has a responsibility to ensure Australia is equipped to thrive in an information economy environment. As such it must concentrate on three things: providing world-class telecommunications networks that are capable of meeting future demand; dealing with the intellectual property aspects of developing and diffusing new technologies; and providing affordable education and training.

The government must facilitate international trade through the provision of timely, relevant and accessible information, the report states. "Key challenges are to promote Australia as a rich source of intellectual property and reduce the cost of border administration.

"Australia is working to achieve an international balance between unfettered markets and the need for a few limited and non-restrictive ground rules for electronic commerce, taking into account the needs of big suppliers of information technology and users of all size.

"An online trade strategy needs to draw and build upon Australia's existing trade strategies and to complement the national online strategy. Online trade is new, but the basic objectives of online and offline traders are the same. They want secure and sustainable access to markets. The fundamentals of doing business successfully online and offline also are much the same."

Selina Mitchell

News Roundup

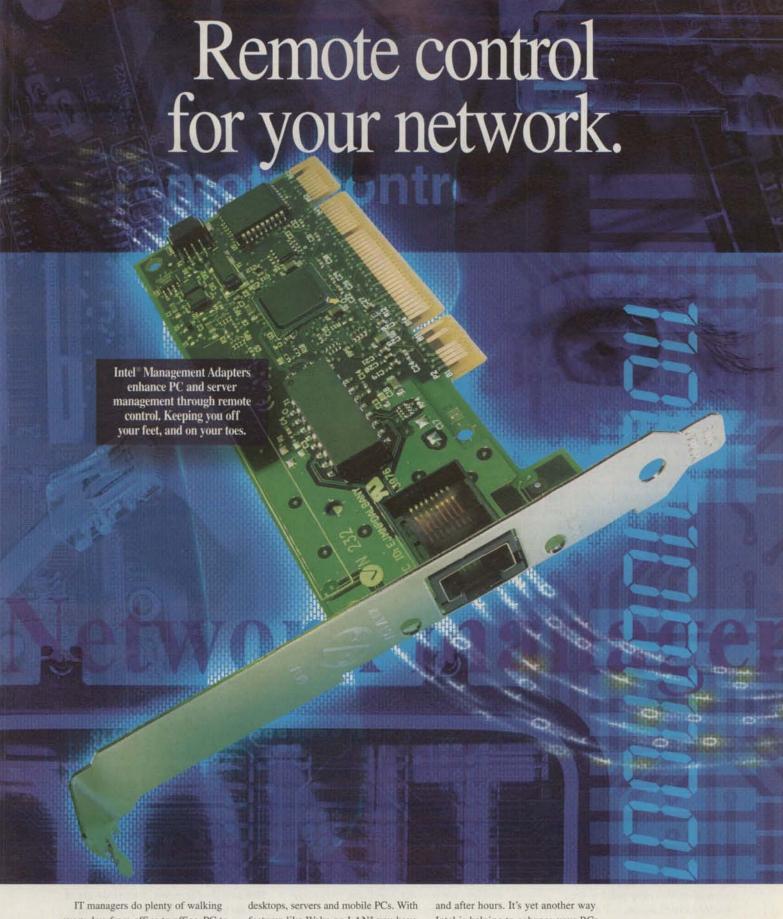
are set for a demolition derby in a race to lure buyers. NineMSN's CarPoint and Fairfax's Drive.com.au both hit the market in March with similar business plans and identical goals. Goal number one is to sign up car dealers willing to take sales leads from the respective sites. Once the dealers are on board, the real battle—luring enough prospective buyers to make

the investment viable — begins.
(NineMSN is a joint venture with APC's publisher Australian Consolidated Press.)

A new software tool from Ericsson aims to significantly improve Web access speeds for mobile data network users, by shrinking the size of Web pages. The WebOnAir Filter Proxy, soon to be available in Australia, uses a variety of techniques to reduce the amount of data in a Web page, while retaining legibility. It slims down the HTML source by removing

white space, comments and other unnecessary constructions, converting the HTML code to lower case, and then compressing the result.

Microsoft Australia has confirmed plans to offer its own online software shop, but officials have warned that the project will not begin in the near future. Director of channels, Geoff Wright, said the company would watch how a newly launched US shop fared before committing resources to a local ecommerce site.



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NEWSWIRE

COULD WE CARE LESS?

40% of firms have no Y2K plans



hile virtually every business in Australia is now aware of the Y2K

problem, only 60% plan to do anything about it, and just 13% have completed repairs and testing, a new study by the Australian Bureau of Statistics (ABS) has found.

Figures released by the ABS found that 93% of all businesses knew of the Y2K problem. Businesses of fewer than five people showed the least awareness at 91%, while no companies with more than 200 employees had not heard of the problem, and only 1% of those planned not to take remedial action. In general, small businesses showed much less concern about the Y2K problem.

An average of 30% of businesses that planned to do Y2K work had not yet done so in October last year when the study was conducted, and 22% did not expect it to be finished until the second half of this year.

A particular area of concern is contingency plans for Y2K failures, which have been made by just 11% of businesses overall. Only large businesses with 200 or more employees seem to have undertaken contingency

planning; 57% of such companies have done so.

Supply-chain issues could also be a problem. Only 19% of businesses have sought assurances from trading partners that they are also compliant, and that figure is again skewed by the 83% of large companies that have done so.

The figures came just days after laws designed to give companies limited protection against Y2K liability were passed by Parliament. The Year 2000 Information Disclosure Bill 1999 ensures that company statements about Y2K preparedness cannot be used as evidence in subsequent liability suits. The new bill will be in force until June 30, 2001.

In February, the Federal Government also finally caved in to repeated requests that it issue detailed compliance information on its Y2K preparedness. In March, regular reports issued by the government outlining Y2K preparations began to include details of each department and agency's compliance testing and repair activities.

Angus Kidman and Roulla Yiacoumi

Zero Zero — Simon Vandore looks at Australia's Y2K preparations. Page 76 IS IT YOUR ABC?

Online firms in float frenzy

hese days, if you're Australian an media company with a Net presence, chances are you're considering floating on the stock market. The Australian Broadcasting Corporation (ABC) is considering joining the everincreasing line-up of media companies eager to cash in on the Internet stock boom by floating its online operations, and Publishing and Broadcasting Ltd's online division, PBL Online, has also outlined plans for a stock market float. (PBL publishes APC.)

A scheme to float the ABC's online activities was proposed in early February by board member Michael Kroger. His suggestion quickly proved controversial, since it would place the national broadcaster under a new set of commercial pressures. While the ABC profits from sales of merchandise through its ABC Shops, that funding is directly returned to the company, which would not be the case if shares of the online operation passed into private hands. Critics also questioned the wisdom of trying to separate online publishing from the ABC's other

PBL is considering a stock market float in a bid to take advantage of the growing interest in Internet stocks.

"PBL is investigating the prospect of floating PBL Online by the public issue of a direct stake in PBL Online and has appointed Goldman Sachs to advise on the opportunities that may exist in such a process," the company said in a statement.

Both moves have been partly inspired by the high prices achieved by other online properties on the stock market. Until recently that phenomenon had been confined largely to the US, but the recent listing of LibertyOne, which plans to develop a local version of the Excite portal, has shown that interest in Net stocks is not confined to Nasdaq.

PBL Online's most visible property is NineMSN, a joint venture with Microsoft. However, in late February it announced a partnership with Internet auction giant eBay to provide a local version of eBay's online auction facilities. The deal will see a customised Australia and New Zealand area of the site launched later in the year.

Fairfax is also said to be considering a plan to float its online operations, although executives have said such discussion is premature.

Angus Kidman

News Roundup

Communications, the Information Economy and the Arts, Senator Richard Alston, will lead an IT&T trade mission to Israel later this year. "Israeli companies have secured important niche IT&T markets around the world, particularly in Europe, and Australian firms can learn from Israel's success," Alston said. He added that Israeli companies

could also learn from Australian firms' knowledge of and access to the Asia-Pacific region. The primary focus of the trip is on IT&T companies — including ecommerce and Internet security, computer telephony integration, voice recognition and satellite technology — but joint venture activities will be encouraged in all fields, said Alston.
The Web habits of Australian IT professionals differ considerably to those of the general population, a new survey has found. Research by national job agency

ITManpower found that career and recruitment sites were the most popular among local IT professionals. Of the 100 applicants randomly chosen by the agency, 58% said they accessed information about jobs on the Web. However, job hunting is not nearly as popular among the general Web-browsing public.

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Chat room caught in court battle

he publisher of local financial site The Chimes has blasted the Australian legal system after the Federal Court ordered him to remove an online chat room.

Stephen Lewis Matthews appeared before Justice Deirdre O'Connor in late February, after the Australian Securities and Investment Commission (ASIC) claimed he was breaching Corporations Law by carrystock in the US," he said.
"Someone has to acknowledge
the right of Net users to have
information delivered in this
fashion. Stockmarket research,
broking, and advice will be a
major beneficiary of the Net
and we should be fostering this
growing market.

"How could it be ruled that I and others were providing investment advice? There is no established identity of those people posting com-



"We are a laughingstock in the US."

- Stephen Matthews

ing on an investment business without a licence. ASIC lawyers succeeded in obtaining an interim order restraining Matthews from publishing investment advice on the Chimes site, and from allowing others to do likewise on the site's chat area.

"I am not a business and I am not offering advice," an angry Matthews told APC. "The judge accepted none of my arguments."

Matthews removed the facility, but posted a notice on his site saying the chat facility would soon resurface on a US domain — out of the reach of Australian law.

"I haven't fully considered the cross-border implications, but if it's a .com.au site, ASIC can apply to have my ISP shut down. I imagine it would be a lot harder to shut down a large US provider."

Matthews said the ruling was an insult to every Net user and one which had negative implications for the whole industry. "We are a laughingments in the forum. It's simply bar talk, hearsay, rumours and speculation.

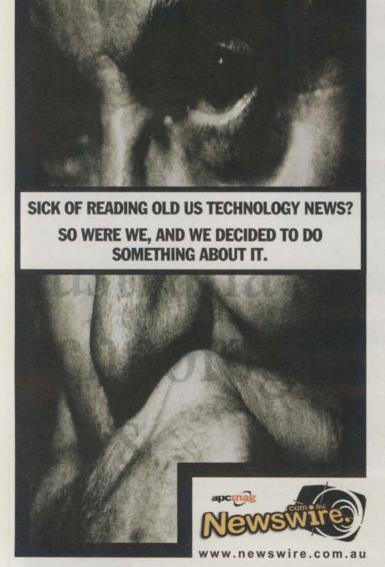
"ASIC and the Australian Stock Exchange are trying to prove that I traded shares. But they won't find anything, because I didn't".

Matthews said he would be seeking the "proper authority" required by ASIC, as a matter of course. "To get a dealer's licence would take some weeks, but to hold the proper authority would take a couple of hours."

The Chimes case was due to come before a new judge as APC went to press. "I will be better prepared and I may have a solicitor in tow," he said. The new judge has the power to overturn the original ruling.

Matthews declined to comment on what he thought his chances were for a better verdict. "I thought I was going to win the [first] hearing," he said. "I thought I was going to laugh ASIC out of court."

Roulla Yiacoumi





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Australia's appetite for computer gaming continues to expand

- but can we support a local industry?

Game for a merger?

f there's one fact that epitomises the reality of developing games software in Australia today, it's that very few of the major games developers working in Australia today grace their Web site with a '.au' extension.

The news that two of Australia's most prominent developers and distributors, Beam and Sega Ozisoft, are planning to sell off their gaming interests indicates the difficulties local developers and publishers face in the tightly fought gaming market. Many companies have successfully developed and launched titles worldwide, but they have done so by concealing their Australian identity, rather than promoting it.

Beam has announced that it is in advanced negotiations to sell off its games development and publishing business. The identity of the purchaser had not been disclosed when APC went to press, but chairperson Alfred Milgrom told APC that the potential buyer is an overseas company. Meanwhile, Sega Ozisoft has signed a deal valued at up to \$10 million with French developer Infogrames that could lead to a complete takeover by 2003. Infogrames has also been named in unconfirmed reports as the buyer of Beam's games division.

Despite the exodus, industry observers are largely confident that other gaming houses will survive. "From the perspective of young game designers, artists, programmers and all the rest of it, the net end result is no different," said Ben Mansill, editor of gaming magazine PC PowerPlay.

In particular, the takeover of Ozisoft is likely to have little impact, since Infogrames wants to use its distribution network to increase its share of the local market. And while Beam's decision to exit games publishing will see some well-known brands such as Melbourne House move overseas, it isn't abandoning gaming altogether. Its Hotgames site (pictured), which has been attracting large audiences with its mixture of games reviews and hints, will be developed further.

The success of Hotgames reflects Australia's growing appetite for gaming. An even stronger indicator is that Sony recently reported the sale of its millionth PlayStation in Australia. The PlayStation's market dominance has created problems for Sony as emulators for its systems emerge (see 'The emulation challenge').



"In terms of importance for international marketing, Australia has always been either number two or number three. We are definitely in the top three," Mansill said. "There are only a handful of games companies left that do not have a presence in Australia."

Nonetheless, the local gaming industry hasn't yet developed to the point where any of the major technology research firms track and analyse it extensively. Nor has its existence permeated through to most buyers.

One challenge faced by all games

developers, local or otherwise, is the need to constantly produce new and successful titles. Because games have a long and expensive development cycle, releasing even one flop can have a major impact on a small company.

On the other hand, a single well-developed game can promote a small firm to international prominence. Ratbag Games, based in Adelaide, has had a good reaction to its recently released Powerslide racing game, attracting positive reviews.

However, despite a well-developed Web presence, Ratbag is relying on distribution by GT Interactive to get the product into the market. And at the end of the day, that's not likely to concern anyone other than those who would like to see Australia's industry receive more prominence.

"No games are marketed in terms of country of origin. It's something that is irrelevant to gamers," said PC PowerPlay's Mansill. "If it's made in Australia or made in America, so what; it's the game that matters."

Angus Kidman, William Maher, Stephen Withers and Roulla Yiacoumi

The emulation challenge

Typically, Sony's biggest rival in the computer gaming market for its PlayStation console has been its main hardware sales competitor, Nintendo. However, recently it has been paying more attention to another emerging market sector: PlayStation emulators.

An attempt by Sony to sue emulation specialist Connectix over the latter's development of a product known as Virtual Game Station, which allows PlayStation games to be used on Mac machines, failed after an injunction was thrown out of court.

Even before Connectix's product, however, a plethora of non-commercial PlayStation emulators were readily available. The majority of these were developed by individuals interested in the challenges of emulation. However, whatever their motivations, the end result is a product which may represent a threat to Sony's tight control of the PlayStation market, and an opportunity for ethically lax

PC users to access pirate copies of PlayStation software.

Probably the best known emulator is PSEmu, a well-regarded freeware package. Keen to avoid piracy accusations, the main PSEmu site emphasises that the software can only be used by owners of a PlayStation console, since it requires a dump of the PlayStation BIOS. However, many users have apparently bypassed this requirement by acquiring illegal copies of the BIOS, which led two of the software's original developers to leave the project.

A similar fate was experienced by PSX 98, a DOS and Linux emulator being developed by Andrew Hogan.

Other prominent emulators include Psyke, which was developed purely for Windows 95 and 98 by Italian developers Giovanni Bajo and Stefano Crosara, and Sope, a Unix PlayStation emulator. Most emulators are still in early development stages, and virtually none can run a large percentage of existing games.

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THE POWER TO CREATE

As USO changes loom, the battle to overtake Telstra remains as difficult as ever.

Tricky times for telcos

espite the deregulation of the telecommunications industry in 1997, every new player that has entered the market has to face up early to a simple fact: Telstra continues to dominate most sections of communications.

That dominance was reinforced by a recent survey of business and communications managers that found Telstra is the leading supplier of telecommunications services in Australia. The Australian Telecommunications Business Users Survey 1998-99 by consultancy Amos Aked Swift questioned respondents about voice, data, mobile and Internet services within their organisations. It found Telstra was the dominant provider in every category, including local, national and international voice provisions; local, national and international data; mobile; and Internet (see table).

Following the principle that when you're on top there's nowhere to go but down, plenty of telcos have lined up to attack Telstra, both in competitive markets and via the regulatory process, where the Australian Competition and Consumer Commission (ACCC) is taking an increasingly active role. The most recent battle has been over the universal service obligation (USO), which ensures that all Australians have access to a basic telephone service. Although Telstra implements the physical service to remote and rural areas, all carriers operating in Australia contribute financially via a levy based on overall revenue.

The entire USO concept is set for redefinition shortly, but that hasn't stopped Cable & Wireless Optus and Telstra engaging in a bitter war of words over the topic. Telstra's claim that the true cost of meeting the USO is \$1.8 billion has been slammed as "junk in, junk out", by Optus group manager for regulatory affairs, Adam Suckling.

The overall size of the USO is set through commercial negotiation between the carriers, in conjunction with the use of a forward-looking financial model designed by US telco Bellcore. Since 1997, the overall size of the USO has been capped at \$250 million.

Suckling's comment refers to Telstra's

Telstra's market share		
Local voice	81.3%	
National voice	59.1%	
International voice	57.2%	
Local data	79.1%	
National data	60%	
International data	41%	
Mobile	60.9%	
Internet	22.5%	

Source: The Australian Telecommunications
Business Users Survey 1998-99, Amos Aked Swift

implementation of the Bellcore model, which requires the use of 'efficient technology' as an input if it's to yield a reliable result. When the model was adopted, however, the carriers were unable to agree on a specified set of inputs, leaving each free to come up with its own end figure. Much of the contention associated with Telstra's \$1.8 billion claim arises from its use of copper cable as one of the inputs.

"The inputs [in Telstra's result] were for the use of old infrastructure," said Suckling. "Copper is a stupid, stupid way of servicing these customers in remote and rural areas."

At its core, the USO is designed to protect consumers whose use of a phone doesn't cover the cost of the infrastructure needed to support it. These consumers are primarily in rural and remote regions that, arguably, wouldn't be serviced by telecommunications companies because service provision isn't financially viable.

According to Telstra's figures, the number of customers falling under the provision of the USO has leapt 1,000% between 1991 and 1998 — from 49,000 to 493,000. Optus claims that of the 493,000 customers under the provision, 161,000 can be serviced profitably (thereby removing them from the USO pool). Of the remaining 332,000 customers, 250,000 can be serviced more cheaply using satellite than by extending and maintaining copper networks. The balance of USO-provision customers can be serviced using either copper or wireless local loop, said Optus CFO Norman Gillespie. "The bulk of these

customers can be serviced using satellite technology," he said. "The true cost of USO, using efficient inputs, is closer to \$178 million."

Cable & Wireless Optus has been running a satellite trial in Western Australia in order to demonstrate the viability of satellite technology to the ACA. The ultimate aim of the trial is a reduction in the USO obligation, and a decision by the Federal Government to open the USO to tender.

Cable & Wireless Optus' Dr Michael Wagg said, "Our question is if this technology is here, available off the shelf, why isn't Telstra using it?"

Telstra's finance director John Stanhope told **Newswire** that the answer was simple: the technology wasn't cheap enough and didn't have the desired quality of service levels. "It's easy to forget that the assessment was made some time ago. We had to make the assessment based on the technology available."

The massive \$1.8 billion calculated as the cost of meeting the USO would probably decrease in the next assessment, due to the implementation of new technology, Stanhope said. "We're looking at satellite, we're looking at other technologies, but when the assessment was made, HFC and copper were the only technology that could provide the service levels required.

"I think that the reason Optus is making a fuss about this now is simple," said Stanhope. "It doesn't want to pay the levy."

Telstra now has a new head to help it face the challenge of both USO and an ever-hungry raft of competitors. In February, Telstra announced Dr Ziggy Switkowski, currently the group managing director of Telstra business and international and a former CEO of Telstra archrival Optus, would take up the post of CEO from departing head Frank Blount on March 1. He has been appointed on a five-year contract. Switkowski has ruled out any radical change of direction or policy for telecommunications giant Telstra, saying the company's commitment to data, mobile and value-added service puts it right on track. "I'll be taking a 'steady as she goes' approach," he said.

Josh Gliddon, Angus Kidman and Roulla Yiacoumi

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Forget technical capabilities — many people are now choosing their software based on its development philosophy.

The politics of software

n his professional life, Cameron Shorter is a computer programmer grappling with the traditional problems of software development cycles that are never long enough. Outside that context though, he transforms, superhero-style, into a dedicated social activist, with a particular interest in public transport and the rights

Some of Shorter's activities in these areas are visibly obvious; he is, for instance, a leading light in Critical Mass, the cyclist lobby group which holds monthly rides through Sydney. However, one form of activism he participates in is less obvious: choosing to use only open source software when developing Web sites.

Shorter recently helped co-develop a new site, active-sydney (http://www .active.org.au/), which aims to provide news and events listings for activist groups throughout the city. Using Linux and a range of open source applications such as PostgreSQL was the logical choice, he said, because he admires the open source philosophy of 'Give as much as you can, take what you need'.

Shorter's attitude may seem unusual to a technology community which has always tended to cast aside concerns over how a product is developed to focus on the 'wow factor' of what it actually does. However, it is becoming increasingly common. On popular Web discussion site Slashdot, the self-proclaimed home of "news for nerds", posters routinely note it is committed to open source as much for its socially aware ethos as for its undoubted technical smarts.

Slashdot is seen as a model of community-minded information sharing by many activists. "One of the best things about Slashdot is that it's unashamedly arrogant geeks. It's not trying to be anything but what it is. And it's actually really using the Internet to be a new media," said physicist and activist Matthew Arnison, who helped develop the active-sydney site with Shorter. "I'd love to see a site like Slashdot that focused on activist news."

More than zero

That's not to say that a shared philosophy is the only factor in choosing open source software. Both Shorter and Arnison hap-



pily proclaim that the zero price tag attached to most open source applications was also a significant factor in choosing them.

'We went for the calendar program [on active-sydney] because it is effective and free," Shorter said. However, choosing a low-budget alternative is also a political choice, Arnison argued. "We've always been a low-budget group, and that gives us more freedom," he said.

Arnison embraces a view of open source that is common among its proponents: it's good not only in and of itself, but because it represents a threat to Microsoft's dominance of the world software market and its attempts to dominate the Internet. "Supporting [Linux] is part of keeping the Internet free," he said. "For Microsoft to keep growing, [it has] to turn the Internet into something else, something commercial."

That view is echoed by many others in the Linux community. Last month, for instance, a Linux-only online store was opened in Australia. While EverythingLinux (http://www.everythinglinux .com.au/) has a profit motive and is selling a range of Linux distributions, applications, books and support services, managing director Anthony Rumble also believes he has a social responsibility to assist in local open source software development. Rumble said he hoped that some of the profits from the business could be

used to create a fund to support the development of open source software in Australia, and that this possibility was being explored with local Linux user groups. "We're already losing too many developers to the States," he said.

In the infamous 'Halloween documents', which outline Microsoft's competitive assessment of Linux, the company talks about decommoditising Internet protocols such as TCP/IP, Arnison said. "I'm surprised more people didn't pick up on that. The notion of free interchange of information is ingrained in the very protocol."

Arnison is heavily committed to spreading the gospel of open source, as well as using it for site development. In a recent paper, Arnison argued that open source software was the logical choice for the Community Broadcasting Association of Australia for both ethical and practical reasons, wryly noting that Windows NT "requires more money" for almost everything.

In a true community-spirited fashion, the active-sydney site is planning to give away its applications to other groups who feel they could make use of them (there have already been expressions of interest from Melbourne, Brisbane and Adelaide). The biggest problem with doing that may be the urge to ensure that the code modifications are checked and cleaned up before the software goes public, Shorter ruefully admitted. "When you're a geek, you just want perfect code."

After that, Shorter also has another project in mind. "I want to build a map of all the bike paths in Sydney," he said, a project that will use Java to allow cyclists to submit details of their favourite cycling routes and then add these to an underlying street map. Again, the selection of Java, which should run on any platform, is not accidental.

Whether the mass market embraces the notion that technologies should be developed ethically as well as effectively remains an open question. However, for existing open source converts, there's little doubt. "It's not just about the tool," said Arnison. "If a tool is politically built the right way, it affects how you use it."

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he day the Pentium III was launched, there was a rash of announcements from PC vendors using the processor. Two, Gateway and Beyond, even managed to get us systems in time for publication.

The specifications of the two systems are remarkably similar. They both use 500MHz processors, 128M of memory and graphics cards based on the same chip (the

The Gateway's hard disk was 5G bigger than Beyond's 9.1G disk, but not as blisteringly fast - not surprising given the Beyond uses an Ultra2 SCSI interface embedded in the motherboard. The DVD supplied in the Gateway system was about the same speed as the 32x CD-ROM in the Beyond, but it has the advantage of being able to play DVDs. Some fine Boston Acoustic speakers and a Sound Blaster Audio PCI 64D soundcard were also supplied in the Gateway system, while the Beyond system came with an excellent Sound Blaster Live soundcard, but poorer quality speakers. Both systems were supplied with quality 17in monitors: Beyond had a Sony Trinitron, Gateway a VX 700. The Gateway also came with a 56K modem. Both are very good systems, but you pay for quality: \$5,850 for the Beyond and \$5,246 for the Gateway.

The system performance provided few surprises and few reasons to upgrade. The Ziff-Davis Winstone scores, at 24.77 and 24.80 for the Beyond and Gateway respectively, are pretty much what

increased clock speed of the 450MHz Pentium II 450MHz right now.

scaled predictably as well. 191.7 in Business Graphics than Beyond.

The biggest selling point for these systems is definitely the 3D performance. Using the SSE-enhanced DirectX 6.1, the systems achieved previously unheard of scores in the Ziff Davis 3D WinBench 99 tests. Both systems scored 729, a far cry from the score of 448 achieved by the Gateway G6-450XL. That said, few games at this stage use SSE, and when tested with DirectX 6.0, the G7-500 scored only 508 (see 'Pentium III inside' on page 95). Unless you're heavily into 3D games, it's probably wise to save a few dollars by buying a Pentium II or Celeron system.

Nathan Taylor

you'd expect as a result of the new processors. The new instructions of the Pentium III do not help here. It's faster, certainly, but the need for that extra speed is questionable - especially at the premium Intel is charging for the processor. Looking at computermarket.com.au for the street prices of the processor, the 500MHz Pentium III costs \$480 more than a although a 450MHz Pentium III was \$20 cheaper than the Pentium II. If you're going to upgrade to Pentium III, it's definitely best to get a

The graphics performance Both systems attained scores of compared to 181 achieved by a Gateway GX-450, which is a 450MHz Xeon machine with a RivaTNT graphics card. In the high-end graphics test, the Gateway scored a little better

Dithering/Z-buffer Perspective correct textures Nearest/linear Nearest mipmap nearest/linear Linear mipmap nearest/linear Mipmap LOD bias Modulate/decal texture blending DecalAlpha/ModulateAlpha blending Flat wrap texture addressing Cylindrical wrap u/wrap v Clamp/mirror texture addressing Cull counterclockwise/cull clockwise Cull cone Fog vertex linear/fog table linear Fog table exponential/specular highlights Colour key/alpha transparency Source alpha/add pixel blending Modulate pixel/2X pixel blending Alpha vertices/perspective correct alpha Alpha comparison >/> or = Alpha comparison </< or = Z comparison >/> or = Z accuracy/bias Anti-aliasing 640 by 480/triangle rasterise Texture fidelity/swapping High triangle count Fog vertex and color key Fog vertex and alpha Alpha and linear Alpha and linear mipmap linear Perspective correct color/specular Anti-aliasing 1,024 by 768

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A satellite service that provides blisteringly fast Internet download speeds for home users.

Satnet

f you're a download junkie, you can't help but be frustrated by the snail pace of the Internet, particularly when experienced through a 33.6K or 56K modem. Until recently, the only option for bandwidth-hungry home users was a cable modem, but high costs and limited availability have kept this out of the reach of most

The idea of using a satellite to download from the Internet may sound a little pie-in-the-sky, but it is available right now, and offers download speeds of up to 400Kbps. Satnet, a division of ISP The Internet Group (TIG), provides satellite Internet connections to home users in Melbourne, Sydney and Brisbane starting from \$49 a month. Customers outside these cities can use Satnet, but will need to pay long-distance phone charges, since a modem connection is still required to negotiate the satellite connection.

The first thing you'll need is a satellite dish, currently a 90cm one, although you will be able to get away with a 60cm dish when Satnet switches to a new satellite later this year. A dish costs \$650, and Satnet offers finance on this up-front cost from \$31 a month. Installing the dish costs an additional \$149 and setting up the account costs \$69. You probably won't need council permission to set up the dish, but if you're in a block of flats your body corporate may not like it. You'll also need a clear line of sight to the satellite (in Sydney, for instance, it is due north at an angle of about 45°). If there are trees or buildings in the way, you're out of luck.

You must be running Windows 95/98 or NT 4.0 on your PC, and it must have a free PCI slot and plenty of space for the large interface card. Satnet recommends a minimum of a 100MHz Pentium processor. Linux drivers are available (without tech support) and Mac drivers are due later in the year. You won't be able to throw away your modem just yet, as you still need to dial up and connect to TIG so that your computer can send requests for data.

Satnet currently offers two pricing plans: Platinum costs \$49 a month for 60 hours' access per month and \$2 an hour for each additional hour, while the Diamond plan costs \$59 a month and has no time limits.



Satnet has an uplink from the Internet to PanAmSat 2, which is orbiting about 35,000km above the Pacific Ocean. Internet requests go through your modem to TIG, then through the Internet to Satnet's satellite uplink, then to the satellite, and then back to you.

Satnet has currently reserved 4Mbps of satellite bandwidth, which is shared between all its customers. This means the total bandwidth available to each customer depends on how many are using the service at the same time. Satnet claims it provides a minimum of 128Kbps to each customer, and up to 400Kbps off peak. Satnet can increase the bandwidth reserved on the satellite as its customer base increases.

What this means is fast downloads. APC's reviewers tried out a Satnet connection, and once we got the hang of it, our minds boggled with possibilities. We downloaded four files simultaneously while watching a couple of streaming videos at the same time.

The four files downloaded at 20K bytes per second each (that's 160Kbps, or three times the maximum speed of a 56K modem, for each file) and the streaming videos came through at the highest quality without any pauses or glitches.

The trick to Satnet is to pretend you are in the US. Satnet's uplink from the Internet to the satellite is in San Francisco, so it's much faster to download from the US than from Australia. Using Satnet to download Australian files means they have to make the journey across the Pacific twice: once

from the server to Satnet's US uplink, then via the satellite to you.

Satnet does have limitations. If the server at the other end is slow, then increasing your bandwidth will make little difference. A Web page or file on an overloaded server will be just as slow over Satnet as it will be over a modem. And while large downloads come through at blinding speeds, Satnet offers little improvement in the loading time of complex Web

pages with lots of buttons or other small graphics.

Gamers will be less than impressed with Satnet's latency. We found that although there was little difference in ping times between Australian and US sites — both were about the 500 to 600ms mark — this is far too long for most online gaming. And for anyone looking for a cheap bandwidth to start making a fortune with a Web server, Satnet's bandwidth is for downloads only; uploads are at standard modem speed.

Satnet is planning to introduce television services through the same connection in the second half of this year, using a settop box that plugs into a TV and doubles as a DVD player. This will offer up to 12 satellite channels such as BBC and CNN, and possibly also pay-per-view ondemand movies. These services will probably still require a modem connection.

Satnet Distributor Satnet Phone Sydney (02) 9324 1500, Brisbane 13 62 92, Melbourne 1800 353 700 Online http://www.satnet.com.au/ Price \$49 for 60 hours, plus \$2 an hour thereafter, or \$59 for unlimited access. In short Very fast downloads. Nice if you can get it.

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Two of the best inkjet printers we've ever seen.

Canon BJC-7100 and Epson Stylus Color 900

he improvements in the quality of inkjet printing over the past few years have been staggering. Technology has driven the printers to the point where real photo quality is not that far away. This month, both Canon and Epson came a step closer to that goal with their respective releases — the BJC-7100 and Stylus Color 900.

The Stylus Color 900 is the next iteration in Epson's successful Stylus line, superseding the 740 as the company's premium product in the range. Like the 740, it features Epson's variable-size droplet technology, making it capable of producing dots at three different sizes for better resolution. It also has USB connectivity (so it is suitable for iMac users), although like the 740, some work still needs to be done on the driver's buggy USB support. The Stylus Color can print at 1,440dpi resolution — still the highest in the industry — on paper sizes ranging from Envelope to A6.

The BJC-7100 prints at 1,200 by 600dpi, a strange step down from the BJC-5000's 1,440 by 720dpi. It does not have USB support at this stage, but does



have some features that the Epson lacks. For a start, it offers the option of using a seven-ink system. Unlike the Stylus Color, the cartridges in the BJC can be swapped at will, and the CMY cartridge (both printers use separate black and colour cartridges) can be swapped for a six-ink photo cartridge. (It's hard to imagine why anybody would even bother with the standard CMY cartridge.)

In the past, APC has been critical of the



life span of the BJC cartridges, but Canon seems to have rectified this somewhat in this range. It now uses massive ink wells which should last quite a bit longer than in the BJC-5000 line. The Canon also features what the company is calls P-POP technology — a bonding agent Canon claims delivers sharper images and better water fastness. It can print on paper sizes up to A4.

In terms of speed, both printers are markedly faster than previous versions. Of the two machines tested, the Canon proved faster at graphics. Printing a full-page colour image with the Epson at the highest resolution took 8 minutes and 30 seconds, while printing that same image with the Canon only took 5 minutes and 40 seconds.

On the other hand, the Epson did provide slightly better image quality, even with only four colours as opposed to the Canon's seven. Differences could be seen in the resolution and solidity of the colours printed, and dithering was more noticeable on the Canon, but its quality was still excellent. Both printers delivered excellent colour gradation, with the Canon's photo cartridge really delivering the goods here. As always, you need photo paper to bring out the best in these printers.

At the other end of the spectrum, when printing plain text, the Epson proved to be a little faster than the Canon. The Epson took an average of just 20 seconds to print three full pages of text at 360dpi. A large chunk of this time was actually spent paper feeding, which makes the speed of the printer near Epson's bold claim of 12ppm.

The Canon was nearly as quick, taking just 27 seconds to print the same three pages. Canon claims a speed of 8ppm. Also, the quality of the Canon's printouts in draft output was superior to the Epson's, and would be suitable for items such as school and university assignments.

The driver interfaces in both products are passable, with a wide range of options and easy-to-use interfaces. The BJC interface, though, annoyingly hides details of things like resolution even in the Advanced Configuration menu. The Stylus, on the other hand, delivers plenty of information, but is notoriously fickle. We've already mentioned the buggy USB support, and there are serious problems if you want to do something tricky like change the interrupt value on your parallel port.

Perhaps the BJC's biggest advantage is its price. Canon has been very aggressive with its pricing of late, and the 7100 is no exception with an expected retail price of \$599. Compared to the Epson Stylus Color's \$899 price tag, this is a real bargain for a quality printer. Still, buyers wanting the absolute best in high-quality colour printing will be well served by the Stylus Color's outstanding print quality — the best we've seen in any consumer inkjet so far, and bettered only by Epson's own Stylus Photo range.

Nathan Taylor

Canon BJC-7100 Distributor Canon Phone (02) 9805 2000 Online http://www.canon.com.au/ Price \$599 In short A great buy, providing excellent quality and speed at a reasonable price.

Epson Stylus Color 900 Distributor Epson Phone (02) 9903 9000 Online http://www.epson.com.au/ Price \$899 In short The best image quality you can get from a consumer inkjet — but you pay for it.





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Autodesk AutoCAD 2000

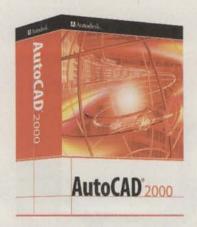
n the two years since the last release of AutoCAD, Autodesk has incorporated over 400 improvements into its flagship product. Release 14, which was a fairly comprehensive and stable release, has been updated to AutoCAD 2000, which is built on the third generation of Autodesk ObjectARX and provides enhancements in a number of areas.

While 80% of the improvements in AutoCAD 2000 are aimed at 2D users, there are some new 3D features that are not to be overlooked. A new 3D Orbit command allows working and editing of a model in a rendered 3D view, in addition to real time rotation of your model, and real-time front and back clipping planes for better visibility. OpenGL hardware and software support is included for increased performance when rotating 3D models and the incorporation of ACIS 4.2, and commands such as Shell, Imprint, Taper and Move Face, mean that the solids are now fully editable in standard AutoCAD, although not parametrically as they are in Mechanical Desktop.

The interface for AutoCAD 2000 has also been improved in a number of areas. For instance, a new Multiple Design Environment (MDE) allows you to not only have multiple drawings open in the same session, but also to create and edit data in different drawings simultaneously. Those who work on projects will appreciate the simple process of copying geometry from one drawing to another using a right-click, or matching object properties to standardise company output.

Apart from the MDE, the biggest visual change to AutoCAD 2000 is the update of Paper Space. The user now has multiple 'paper spaces'. These come in the form of tabs, similar to those found in Microsoft Excel. Each tab represents a drawing 'layout', and can be set up entirely differently from any other. The differences could include title blocks or Viewport layouts, as well as incorporating a totally different Plotting Style. The Plot Styles provide a mechanism to plot the same geometry in many different ways, such as using different pen weights, line types or line densities.

A welcome addition to AutoCAD is the new non-rectangular Viewports; a spline



or any other close geometry can be used to define a Viewport. Once defined you can then set the scale via a pull-down list, and lock the scale so that it can't be modified accidentally.

The centralisation of all of the property commands such as CHANGE, DDCHPROP in the Object Property Manager will be of major benefit to new users as well as existing users. This 'modeless' dialog (it stays on the screen while other commands are used) will also reduce the number of LISP programs required. For instance, you can quickly change the height or style of multiple pieces of text, or the layer or colour of several objects at once. Additionally, the updated right-click menu system provides an intuitive interface to current commands by updating its contents depending on the current command, or type of selected objects.

Another new feature of AutoCAD 2000 is the Design Center. It allows the drilling down or mining of data, and simplifies processes such as copying dimension or text styles from one drawing to another. It can also be used to manage your block libraries. A Partial Open feature allows you to only load a specific portion of data into RAM and in conjunction with 'in place' xref and block editing will improve productivity when working on large data sets. Two additional object snaps, Extension and Parallel, work well with Object Tracking, which is a greatly enhanced version of the tracking features of earlier releases.

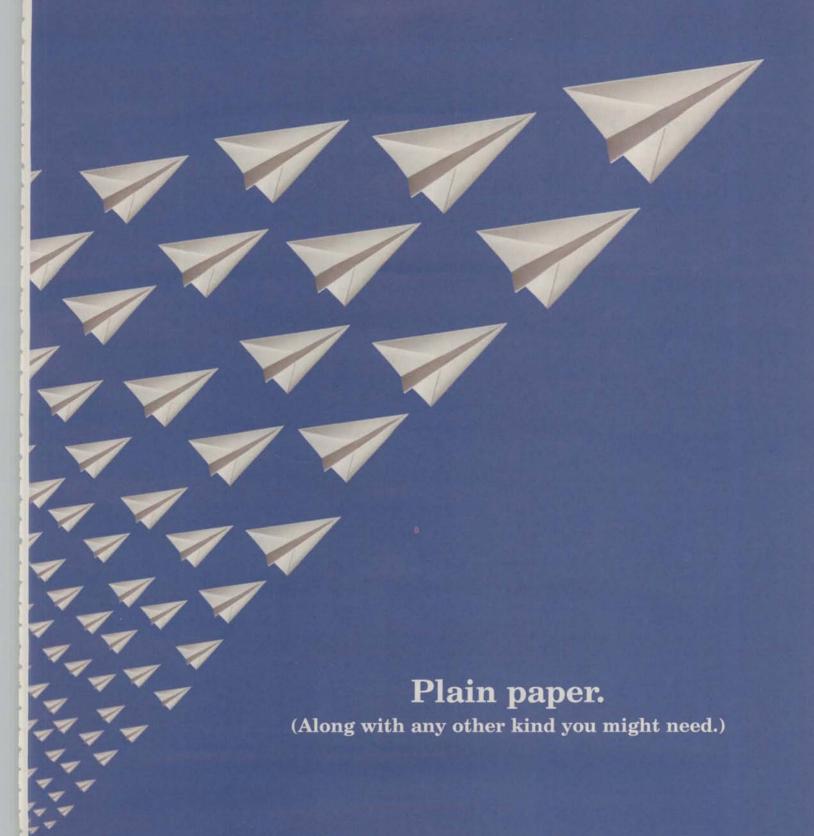
Improvements to symbol table information mean that AutoCAD can now use up to 255 characters for Layer, Block and other symbol table names. Apart from support for long names, Layers now also includes support for the new line weights (onscreen line weight can be added to lines and circles and so on) and a 'plot/no plot' toggle — so that onscreen visibility no longer dictates plotted output. The new drawing file properties that can be viewed from either the Autodesk Design Center or from Windows Explorer make it easy for non-AutoCAD users to identify specific design drawings.

AutoCAD 2000 now uses Heidi drivers for Plotting, and no longer supports ADI drivers. This means that users will have to obtain a new Heidi driver if it is not supplied with AutoCAD (Hewlett-Packard, Océ and Xerox are included), or revert to using a Windows printer driver. For those publishing on the Net, Autodesk also provides a Plot Driver to create DWF files, which therefore allows line weight to be included in the output.

AutoCAD 2000 also extends the ability to customise with the inclusion of Visual LISP, which was previously an extra cost item. You can now customise AutoCAD using AutoLISP, Visual LISP, Microsoft Visual Basic for Applications (which now supports multiple projects), and ActiveX, as well as using Visual C++ Version 6.

All of these improvements mean Autodesk's efforts over the last two years have not been wasted. It has delivered the things that customers requested. The simplification of older commands, changes to Paper Space, and the new dialogs will shorten the learning curve for new and veteran CAD users alike. The 3D Orbit and ACIS solid editing will please those who work in 3D. Overall, a product with something for everybody who uses CAD. Jeff Baker

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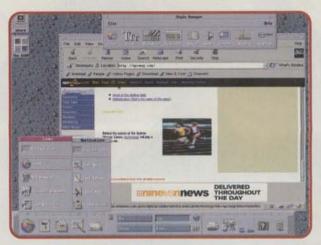
Solaris 7 for Intel

olaris. Sun's own Unix variant, has been evolving since it debuted for the Intel platform in 1991. Since then it has become a trusted and respected name among system administrators. This latest release introduces a number of new features and a name change for the Solaris operating system. Rather than go with the traditional naming mechanism, Sun seems to have taken a leaf out of Microsoft's marketing tome and named Solaris 7 the successor to Solaris 2.6. Future versions will also only have a single version number, and updates to the OS will be date-stamped upgrades.

While Solaris 7 is aimed firmly at the corporate market, APC was keen to explore this latest Solaris release given our recent stint with the Linux operating system. Although it's not an accurate comparison, it is interesting to see the level of development and integration between a commercial form of Unix such as Solaris, and an open source Unix such as Linux. For example, Solaris comes with a suite of administration tools designed specifically for Solaris, and whereas Linux uses XFree86 as an X server for the X Window GUI, Solaris uses OpenWindows with the commercially developed CDE (Common Desktop Environment) as the operating environment.

The feature set of Solaris 7 is extensive. Solaris is now a full 64-bit operating system — if you happen to be using SPARC hardware. However, according to Sun, Solaris 7 has been tested on a beta model of Intel's 64-bit Merced chip, and will fully support Merced soon after its release. Other new features include seamless connectivity to Windows 98 and NT, OS/2, Netware, Macintosh and other Unix variants, euro support, the latest Solaris optimised versions of the 1.2 Java Runtime Environment (JRE) and Java Development Kit (JDK) and, as you would expect, full Y2K compliancy.

For our review we installed Solaris 7 on a Compaq Deskpro 6350, a Pentium II 350 machine with 128M RAM, 10G IDE drive and an 8M Matrox G200. Installation was a snap, with an excellent hardware detection routine that managed to correctly detect all of the hardware bar the video card (X Window is separate from the main installation). Even the latest Intel-based network card was correctly detected,



always handy for a machine destined to be a server.

Apart from the traditional automated install, Solaris 7 also offers a new and easy-to-use 'Web Start Wizard' install routine that allows you to install various packages through a browser interface. This same interface is also used to install and configure a wide range of Solaris application software, such as the Solaris Easy Access server or Solaris ISP server packages.

Our only installation hiccup was in relation to configuring X Window — Solaris 7 doesn't support the Matrox G200. As a result, we decided to venture into the realm of system reconfiguration and install the latest version of XFree86 which supports the G200. We quickly discovered how the Solaris directory system differs from that of Linux, but with some trial and error and a quick read of essential documents it wasn't long before XFree86 was up and running and we were working our way through CDE.

As far as GUIs go, the combination of OpenWindows and CDE is remarkably efficient. CDE is intuitive and easy to use and, when supplemented by Solaris' own toolset, we found we rarely needed to use the command line. For a Unix-based system, this is praise indeed. All aspects of

system and user administration could be handled through CDE and Solaris' administration applications. A central front panel allows standard applications to be 'docked' (such as CPU and disk

> activity) or launched (such as the administration tools). It also serves as a place to manage multiple desktops and organise applications via multiple slide-in menus. Even the file manager is well integrated, and for those Unix users who aren't fond of mounting and unmounting external devices, Solaris will do it for you. There's even an integrated help system that uses Solaris' AnswerBook format, in which just about any query you have will be

answered. Browser-wise, Solaris defaults to Sun's Java-based HotJava browser, although Netscape 4.5 is included separately.

Overall, Solaris is fast and stable, and above all else, very well integrated as a complete system package. It's a niche product; unless you need an operating system to handle very demanding situations, or your application software is Unix based and can be ported, you won't find a need for the powerhouse performance and stability that Solaris is reknowned for. It was an interesting experience to explore Solaris, and for now, this reviewer is still using it as his (albeit somewhat undertaxed) workstation. At least it hasn't blue screened yet.

Ashton Mills

Solaris 7 for Intel

Distributor Sun

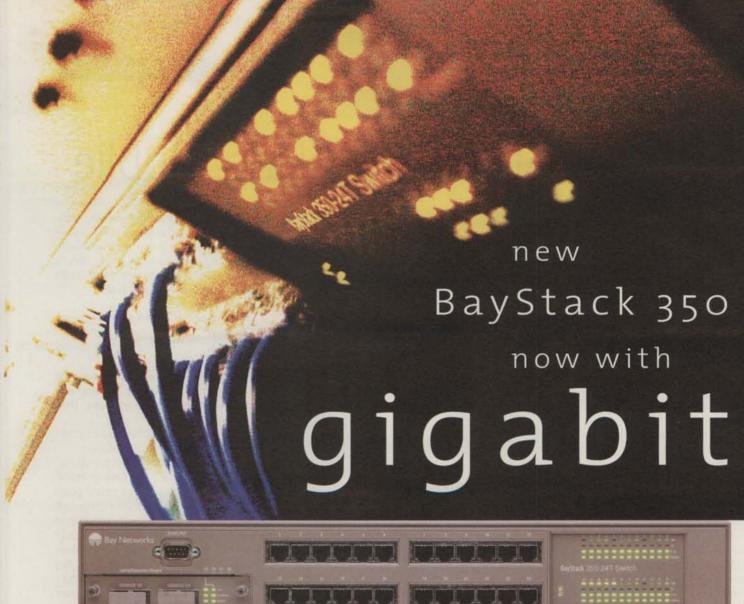
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How the world shares ideas.

Dragon NaturallySpeaking Mobile



small recording device you can speak into and then plug into your PC to automatically retrieve and transcribe your

notes — it sounds great, doesn't it? The verdict after testing one such product, Dragon NaturallySpeaking Mobile, is that we were left wishing things worked as well in practice as they do in theory.

The NaturallySpeaking Mobile package consists of a tiny digital 'voice-to-text recorder' (VTR) device; Dragon's Naturally-Speaking software, including the PC linking software Voice It Link; the link cable; and a headset.

The idea behind this product is that you take the recorder with you wherever you go and record messages and notes, up to 40 minutes in duration. The recordings are stored in different folders. When you get back to your PC, you link up your recorder and transfer the recordings to the PC as audio files, which are then loaded into Dragon NaturallySpeaking (part of the package) and translated into text. You then open the documents within the software, where you can make changes by speaking into the headset and dictating your corrections. You can also use the headset and speak directly into the software program. The text is then entered directly on the screen, in short bursts of phrases.

We found the recorder very easy to use. The one-step recording means you aren't fumbling around when that vital thought pops into your head. You can delete folder contents by holding down the delete button, and all of the other buttons are self-explanatory. The recording quality was also very good.

The first problem we found in our testing was at the stage of reading onscreen what we had supposedly told the recorder. The results vaguely rhymed with what we said, but definitely weren't what we said.

The accuracy of how well your voice can be transformed into text depends largely on how well you train the software to recognise it. To do this, you must read one of three lengthy passages into the recorder. For our test, we read an *Alice in Wonderland* excerpt, which took 26 minutes — that's a long time to be reading while consciously pronouncing each word clearly.

The software then goes off to analyse the sound and pronunciation of your spoken



word. Following this, you can begin using the recorder and software. (Naturally-Speaking will also work in supported word processors such as Microsoft Word 97 and Corel WordPerfect 8.0.)

But there is still much work to be done. Building up the vocabulary is essential to increase the accuracy of your documents, but it is time consuming. When you run the Vocabulary Builder in the software, it asks you to submit written documents which are typical of the text you will be dictating. It could be letters, email messages, reports or memos. Vocabulary Builder then scans the documents and lists any unfamiliar words which you can then train it to recognise.

When we said 'hello Roulla' into the recorder, the software interpreted this as 'hello ruler'. This was phonetically correct, but we then trained the software to associate that spelling with the pronunciation. The next time we said 'hello Roulla', the software correctly processed our pronunciation.

We thought we'd try a few other phrases, but didn't have much luck. Our 'good or bad, happy or sad' turned into 'or that he will stand'. It can be very frustrating, when you try pronouncing the phrase in a number of different ways, and still get a different incorrect result each time.

This process is further frustrated by the fact that you will need to use a number of phrases to edit and navigate your document. Phrases such as 'delete that', 'new paragraph', 'cap', 'move up three lines', 'italicise that', and 'full stop' need to become second nature. (If you get stuck, there's always the useful 'give me help' command!)

So, dictating a memo such as:

Hello John,

How about a meeting tomorrow afternoon?

Call me.

would sound like:

Hello John comma new line cap how about a meeting tomorrow afternoon question mark new line cap call me full-stop

(By the way, the program had no problem recognising the name John.)

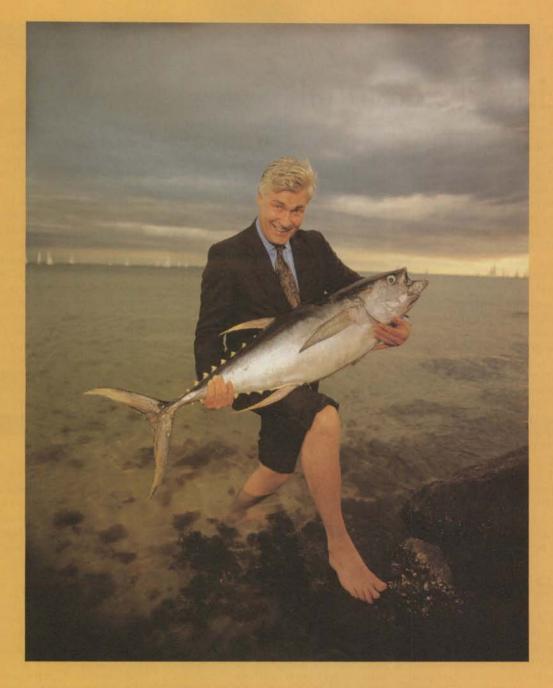
The phrases take a bit of getting used to, but seemed to roll off the tongue much more easily after a couple of hours' practice. Of course, you can edit your document by manually entering any corrections using the keyboard, but this probably defeats the purpose. (For a more comprehensive look at Dragon NaturallySpeaking software, check out APC March, page 42.)

We had one glitch, though. There were no problems connecting the recording device through the serial port of our Pentium II 300MHz with 128M of RAM, but we had no luck connecting it to our notebook. Conflicts with comm ports abounded and we simply couldn't get the recorder to speak to the machine. We were unable to resolve the problem.

This is an expensive recorder. The package is officially listed as \$699, however, you could save yourself \$100 or more by shopping around. If you are interested in voice recognition and have the time to build up a solid vocabulary, it could prove very useful.

Roulla Yiacoumi

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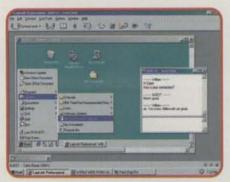
LapLink Professional

emote access software is used to transfer files from one computer to another, to allow mobile workers to log in and control their office PC when on the road, and for technical support purposes. These tools have been around for several years, but the recent introduction of Universal Serial Bus (USB) has given them a real speed boost.

LapLink Professional is the first remote access package to take advantage of USB, and the benefits are extraordinary. A 40M file, which would take over half an hour to transfer via a serial port, takes about 1 minute using LapLink Professional and a USB port.

USB installation is a breeze under Windows 98. The system automatically detects the USB cable and prompts for a USB driver, which is supplied on floppy disk with LapLink Professional. Once the driver is installed, reboot and you're away.

LapLink is also the first package to support Windows Fast Infrared (FIR) as well as other standard connections such as TCP/IP, IPX, ISDN and modem. The latter in particular benefit from LapLink's SpeedSync compression, which the developers claim is more efficient than other



'delta' techniques. Serial or parallel cables can also be used if it's really necessary.

However, file transfer is only a small part of the LapLink package. For mobile workers, the big drawcard is remote control. This allows a notebook user working at home or on the road to control an office computer as though they were sitting in front of it. This feature has been available in most packages for several years, but it is only now that several annoying software restrictions have been resolved.

Logging in to a remote computer, for example, has been greatly simplified by eliminating the need to set each computer as a guest or host. With LapLink Professional, a mobile worker can log in to any office PC, as long as it is turned on and running the software. This version also allows users to regain control of a remote computer after that system has been rebooted.

Screen refresh rates have also been improved. When using Windows 98, the software can automatically disable features such as Active Desktop, font smoothing and other options that slow performance. However, twitchy mouse users should be warned that performance will slow to a crawl when the software attempts to keep up with your movements.

Perhaps the only thing missing from LapLink Professional is a feature that will prevent remote users from accidentally accessing the host's LapLink window.

William Maher

LapLink Professional Distributor Hot Key Phone (02) 9922 5199 Online http://www.laplink.com/ Price \$199, \$79.95 for USB cable In short USB support has significantly enhanced LapLink Professional.

PowerQuest Lost & Found

ost & Found is a DOS-based data recovery tool that aims to eliminate the need to send disks to a professional data recovery centre if critical data has been lost, whether through accidental deletion, disk error or damage. It's meant for emergencies — PowerQuest claims that as long as the platters on your disk still spin, data can be retrieved.

Accordingly, Lost & Found is quite a complex and powerful tool — deceptively so, considering it comes on just two 3.5in floppy disks and only runs in raw DOS mode. It's not for beginners, as it involves such things as examining the first cluster of a lost file, but those who miss the Undelete utility included in MS-DOS 6.x are sure to like this product.

When Lost & Found analyses a disk, it sorts the deleted and corrupted files it finds into colour-coded groups depending on the chances of recovery. Naturally, the more disk activity following deletion, the harder it will be to recover files, and files which occupied storage space that has

since been overwritten are generally unrecoverable by any means.

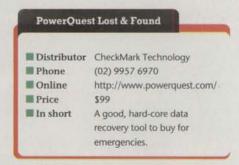
Examining a disk can be a slow process. APC had no problems recovering recently deleted files from a hard drive, so we put Lost & Found to the test with a 701K installation program housed on a 1.44M floppy disk which had been stamped on, written on and poked with a ballpoint pen. Windows and DOS reported a data error and would not read the diskette, but Lost & Found spent around 1 hour examining its contents, reporting that only about 25% of the sectors were readable and then attempting recovery. A complete 701K file was produced and was still able to run itself, display a logo and begin its installation process, although it hung at 25%. Still, this was an amazing effort by Lost & Found - a large amount of lost information could have been salvaged.

Recovered files must be written to another disk, whether a floppy (spanning multiple disks if necessary) or another partition. Unless the original directory structure is retained, recovered files are initially stored as a proprietary backup saveset from which restoration is completed with an included 32-bit Windows utility called ReNew.

PowerQuest's copy protection meant APC could only test Lost & Found on a single PC. Search & Rescue, an expanded version of the product, can run on any number of systems.

If you have a real disk emergency involving critical data that's beyond the reach of ScanDisk and the Recycle Bin, Lost & Found offers genuine assistance.

Simon Vandore





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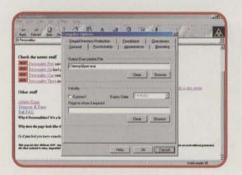
3 62 92

WebCompiler and HTML2EXE 2.1

definite problem with using HTML to develop a company intranet or, say, a training application is the need for a constant Internet connection at the client end. Oakley Data Services' WebCompiler and Update Computer Services' HTML2EXE 2.1 both attempt to remove this need. The basic aim of both compression packages is the same — to convert a Web site into an EXE file which can then be run on any Windows machine to allow visitation of what is in effect a virtual site.

This sort of product would be most useful for secure documents — catalogues, training applications and so on. It's important to keep track of what is supported on either program — WebCompiler supports JavaScript (but not Java) while HTML2EXE 2.1 only supports basic HTML and images.

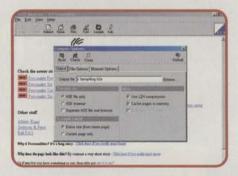
Both programs are easy to use. Follow a couple of predefined buttons, work out the location of the files you want to compress, and off you go. Both rely heavily on



an Internet Explorer-style interface, which means that program elements are laid out logically. Unfortunately, both programs have a few bugs.

Of the two packages, HTML2EXE 2.1 suffers the most in evaluation terms, mostly due to the rather odd nature of its compression. The interface presents you with the option of compressing a single page (the point being?) or the entire site. Fine, you think, choosing the entire site to compress and setting HTML2EXE 2.1 on its merry way. About 10 minutes later, you are presented with a list of error messages relating to missing files. A little investigation pinpoints the problem — HTML2EXE 2.1 is unable to differentiate between local and remote links, and so tries to capture the code and images for all of them! This

really is quite a big strike against it, as it slows compression while it tries to work out what it can and can't find locally, and it creates problems with the end product. For some reason, HTML2EXE 2.1 also had



some problems finding some locally stored images from the test Web site APC used. Odder still, the finalised EXE had no problem then linking to any external sites, intelligently launching extra browser windows to do so.

On the plus side, it does allow you to specify the HTML editor to be used in conjunction with HTML2EXE 2.1, which allows for simultaneous editing and compression. User specification allows quick switching between editing with Dreamweaver and Notepad; both launched and saved without error. A rather nice touch is the ability to define the top left-hand corner logo to whatever bitmap you like — this would be ideal for a company promotion, for example.

The shareware version is limited to the production of EXE files with a 24-hour life span, which may not be the best way to present the product to any business where software purchases need to go through multiple decision makers — you'd have to recreate the site several times during evaluation, which could be painful. The site produced as an EXE file which weighed in at 1,474K, from a 1,627K site, although as noted above HTML2EXE 2.1 missed some images, so assessing the actual level of compression is a little difficult.

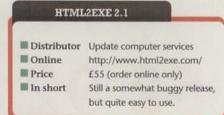
WebCompiler, on the whole, comes out on top of HTML2EXE 2.1. Simple compression is possible with a couple of mouseclicks, but there's also a great deal of customisation available within the package, from corner icons and splash screens to multiple level and remote directory access. It's also a lot easier to define the end interface, from buttons to password protection. Most of this functionality has been lifted directly from Internet Explorer. The program requires IE to be installed in order to function at both server and client ends. This is an inconvenience for those who don't use IE. It also raises the question: how many people have no Internet/intranet connection at all, and still have a browser installed?

Site editing is also harder in WebCompiler than in HTML2EXE 2.1 - instead of being able to define an editor, you can simply select to view the source which automatically opens in Notepad, which isn't suitable for large files. The compressed EXE file came in at 1,778K, which is actually slightly under the '270K plus' the documentation suggests it adds to the average site. Unlike HTML2EXE 2.1, it had no problems with images on the site, and was bright enough to work out what was an external link. The help documentation was clear and concise. Testing it on a non-IE machine brought up a 'you need IE4 installed' error box, which was at least clean, if not entirely satisfactory.

Overall, both products present an interesting idea which has some obvious commercial applications, but both products still present problems — HTML2EXE 2.1 is still a little buggy, and needs to work out what a 'local' site is, while the IE4 dependency of WebCompiler is a problem in terms of cross-platform use.

Alex Kidman





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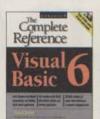


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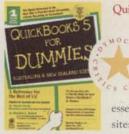
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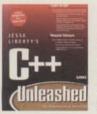
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READERS' SAY

Alpha praise

I recently read your December issue. It was the first time I bought your magazine. I purchased it mainly because of your information on PCs under \$2,000 - I was in the market for a new computer and it looked like a great place to start. You guys saved me a lot of time and stress after reading about the Alpha PII-350. Living in Melbourne it sounded like a great opportunity to get a fantastic system for a sensational price.

In the end I actually went for the new Celeron 400 chip instead of the PII-350, plus a Diamond Viper V550 graphics card. After putting in my order, the people at Alpha had a bit of a struggle getting my system to me as quickly as I would have liked, but once I got it, boy was I rapt. The computer runs absolutely sensationally; I did not have one problem, and every piece of software and hardware had been installed and configured perfectly. I would have to say that I would recommend Alpha Computer to anyone living in Melbourne. The system runs so well, at a great price [about \$2,300]. By the way, I now subscribe to APC — it's a great mag.

Alastair Isherwood Mulgrave, Victoria

Ed note: Well done Alpha. We also fielded a couple of complaints from readers about Alpha, mainly regarding the unavailability of 350MHz PII-based PCs, as featured in our December reviews. An Alpha representative told us that these supply problems were due to: the company not anticipating the surge in demand in its forward forecasts; a general shortage of PII 350s from November onwards; and the fact that regular customers took priority over new customers. Alpha says it is honouring its commitment to supply machines with the specifications and pricing featured in our review, subject to changes to general componentry.

OS shoot-out

I think an in-depth comparison of the major operating systems would make a fascinating article. Put Windows 95/98 up against NT, OS/2, Linux and Mac OS to compare ease of use, installation, hardware compatibility, available software and stability.

Peter Faulks Internet

Ed note: Good suggestion. It's not easy to properly compare OSes, but we're going to have a crack at it in our July issue.

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FORUM/APRIL 1999



Hijacked

The front door may be bolted and barred, but thieves could be making off with the family silver out the back door.

By Helen Dancer

here's an old story about a man who was so paranoid about burglars that he bolted and barred the front door. He spent sleepless nights on a chair in the hallway with a shotgun, waiting for would-be plunderers to try to steal his worldly goods. So obsessed was he with guarding the front door that he didn't notice when thieves broke in through the back door and stole everything he had been so jealously guarding.

I'm beginning to feel the global obsession with the year 2000 is a bit like the front door of the man's house — what opportunities or dangers are we missing out on by not taking our eyes off it for a second?

Regrettably, there's still a long way to go for many, and for much of corporate Australia that has done its door, bolt and padlock testing, the door will remain firmly shut until the new year, regardless.

IDC analyst Graham Penn said that the time between now and the end of the year will be the most critical for hardware vendors, since the vast majority of people who have put their house in order won't be messing with the formula by adding any new pieces to it. Keeping the status quo will be the priority. He considers the worst thing in such a situation would be to add some new components to a perfectly functioning system and have it fail. You would then have to spend more time ascertaining which aspect was at fault.

So while it's likely we'll see a significant decline in hardware spending over the next two quarters, Penn also believes that the expected slowdown explains the strength we've seen to date. He anticipates that after the drop-dead date, the phenomenon will also positively affect hardware expenditure. The very active market of last year can largely be explained, he believes, by the purchase of test servers and storage which would have been used offline over the testing period. He also

believes that when the perceived danger zone is past, those test purchases will be followed up with more of the same, making the market buoyant again.

QSP's regional general manager Ross Liston also recognises the pattern of interrupted spending, but says the emphasis is different — much has been spent on the part of the system which is mission-critical. Upgrades of applications have happened well in advance, and they have been tested extensively on an existing back end, he said. It's the back end which has been meted out with the Bandaid treatment. Organisations are making sure the mission-critical stuff works on the back end and are holding fast to that while they cross the finishing line.

It's all evidence of the politics of careful business management and the need to balance the budget and not let IT spending blow out, but in the end it serves to reinforce the notion that companies are bunkered down pending the end of the year. This puts them at risk of losing sight of the bigger picture or, if not losing sight of it, watching it sailing away. Penn observed that projects not grasped and followed through will inevitably take a different form or have a different function by the time they are picked up - next year or whenever. Internet Industry Association of Australia board member Bruce Linn agrees, citing the analogy that an Internet year is two months, and that the pace of

What opportunities or dangers are we missing out on by not taking our eyes off the year 2000 for a second?

There's also the issue of testing, but according to Liston, this will be resolved well before the end of the year, due to multiple reporting structures. But most of our major enterprises are subsidiaries of overseas companies, and this means there is no standard end of the year. So while some companies follow the June 30 end of year, others, typically UK companies, follow the calendar year, and others use any month in between. Add to this the fact that organisations' balance sheets require estimates 12 months in advance, and you realise that by the end of February, most will have forecast beyond 2000 and should know whether their systems can cope. Given that next year is a leap year, and February will have 29 days, Liston observes, most will know well before the year's end whether the Bandaids they have applied are going to stick.

change has significant implications for the projects we're not concentrating on while we focus on Y2K compliance.

The realm of ecommerce is an obvious example, Linn said. Whereas Canada and the US are embracing epayments, Australia is falling well behind. Businesses are not jumping in, and he sees that as being largely due to the banks' reluctance. Whether they are blindsided by the technology or simply have insufficient resources to do both, he said it's nevertheless a frustrating paradox, since it's the banking industry which has the most at stake.

TS Eliot crafted a wonderful line of poetry describing "the end of all our beginnings" in which we return to the place we first started, opening the door and knowing it for the first time. Let's hope that that will be the case, rather than that of Mrs Hubbard, who opened the door to find nothing there.



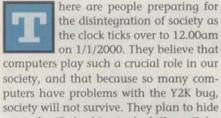
FORUM/APRIL 1999



It's not the end of the world

It has been 50 years since the development of the first digital computer and it is the last year of the 20th century. It may also be the end of civilisation as we know it.

By Jeremy Horey



society will not survive. They plan to hide out in fortified cabins in the hills until the worst is over.

Even responsible commentators are suggesting you take some money out of the bank and stock up on food before the last day of the millennium. Perhaps it is wise to take some precautions.

I am not an expert on the Y2K problem, although I have read extensively on the subject. I am going to stick my neck out anyway and tell you what I think will happen on January 1, 2000. Life will go on as normal. First of all, it is a public holiday and if any business is going to have problems with their computers getting the date wrong, it is not likely to happen until people actually go back to work and switch them on. When they do get back to work there may be a few failures, but this will have almost no effect on business.

I also believe that all essential services will be unaffected. I believe that embedded processors in fridges and VCRs and cars will keep on working as normal. I don't believe the prophets of doom.

I am not an expert on the Y2K problem, but I have had some experience with this issue. I was working with the Australian Tax Office as a programmer more than 15 years ago when the office's information storage system was redesigned.

At that time, the dates that were stored as two digits were expanded to four digits. Although I wasn't involved in this work, I remember the discussions about it well.

Since then I have followed the issue with some interest. A lot of the noise about the Y2K issue comes from the media. It is,

after all, a great story. Here are all these computers doing vital jobs around the world and they have a fatal flaw. They can't deal with dates after 1999. Suddenly, at the end of the millennium, they will all stop working and we will be left high and dry without our electronic helpers.

It makes good copy and also feeds into other ways of thinking. There is still a distrust of computers. To some people they are still mysterious, with a nature that can be good or evil. Also, we are not only at the end of a century, we are also at the end of a millennium. This has a dramatic effect on the way people think about things.

their Y2K projects on time, they will have fall-back plans in place.

For other bodies, the Y2K problem may not be seen as important. But if these bodies do not fix their Y2K bugs on time, what will happen? At worst, they may be forced to turn back the system dates on their computers, manually date their accounts and give their clients slightly longer to pay.

But what about embedded processors? How can we know that they won't fail on us? Of course we cannot be absolutely sure. But only the most foolish programmer would build an embedded processor that depends on the correct

To some people computers are still mysterious, with a nature that can be good or evil

Whatever you think about the origin of the way we number years, there is no evidence that the numbering system is anything more than an accident of history. But although there is no significance in the end of the second millennium of the Christian era, it does affect the way people think about things. There is a feeling that 1/1/2000 represents a new start and that we should finish up as much as possible this year to make room for new things in the next century. People are also planning special events for 2000.

But just because people see some special significance in the date, it doesn't mean that computer systems will fail in sufficient numbers to have any major impact.

In the developed world, large amounts of cash have already been spent fixing problems arising from the Y2K bug. In my experience, large institutions like power companies, banks and telecommunications companies make sure that they don't jeopardise their own future. Even if they don't complete all

date to operate, if there was no way to change or reset the date. Obviously no programmer could be sure that the processor would always have power to accurately keep track of the date.

So it follows that while we cannot completely rule out stupid programmers, almost every embedded processor that depends on having an accurate date will have some way to set the date. So if these devices do go wrong on 1/1/2000, all we have to do is turn back the date to some time before the end of 1999. This should give us breathing space to either fix it or find a workaround, or to decide that these devices are not worth saving anyway.

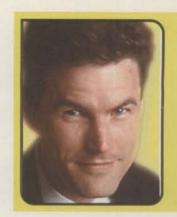
I am optimistic about Y2K problems. I don't suggest that we take them lightly, but on the other hand, let's not set off to some hidden lair at the end of 1999. Let's stick around and celebrate the start of another thousand years.

You can contact Jeremy Horey at jeremyh@techtalk.com.au.

Under a dictatorship the trains might run on time, but it's invariably at the cost of innovation, and who knows what else.

By Bruce McCabe

Monopolies' money



ccasionally, when conversations turn to topics such as unemployment, crime, or poor government, we hear a voice pipe up: "What this country needs is a dictator!". Mostly, statements like this aren't made seriously, but they reveal a frustration with the slow pace and indecisiveness of modern democracy. Tough action without the shackles of human rights activists and other 'do-gooders' might be decisive in, say, cleaning up crime.

In the real world, of course, any dictatorship or pseudo-dictatorship might get the trains to run on time, but it always comes at the cost of corruption, censorship and human rights abuses. Such things are not always immediately apparent to everyone. It wasn't that long ago that many Australians looked with admiration to Dr Mahathir for getting the Malaysian economy moving, enticing foreign investment, raising education levels and embracing high technology. Some of his rhetoric was annoying, but Mahathir was admired for his strength and his ability to 'get things done'. Now the Anwar Ibrahim case has exposed to everyone what has been taking place in Malaysia all along. Fact is, the wise, benevolent dictator that gets things done, respects the rights of others, and refuses to abuse his power just doesn't exist.

To my mind, monopolies are just business versions of dictatorships and, since the DOJ case against Microsoft, the term has become very topical in the IT industry once again.

In the IT world, you can make a case for the benefits. Talk to any IS manager about the challenges in their job and you will be talking about standards and interoperability before you know it. Differences in networking protocols, being unable to open documents sent by customers or suppliers (or even between departments), the challenges of interchanging records between databases, or

the difficulties of supporting users with different software profiles are just a few examples of issues they have to cope with every day. Standards are important to them. Standards are so important that they often find it more valuable to install a good solution that has 90% market share than an excellent solution with 5%, because the latter choice represents bigger challenges when it comes to finding staff with the appropriate skills, adapting the package several years down the track, or making it work with other software. The risk that the supplier won't be around in a few years' time is also greater.

competitors to eliminate the differences goes against this philosophy somewhat, and history has shown us (that is, Unix) just how difficult this is in practice.

So monopolies, or pseudo-monopolies, make standards, and in the IT world this matters - a lot. But what is the downside? The first thing we think of is usually pricing, which either rises or doesn't fall as rapidly as it should. Interestingly, it is difficult to make a case against Microsoft on this one, since per-licence pricing has remained exceptionally stable, while more features have been added over time. (Instead, Microsoft has made licensing

Monopolies are just business versions of dictatorships and, since the DOJ case against Microsoft, the term has become very topical.

When one technology dominates, it sets standards by default, and no-one will argue (except Apple diehards) that Microsoft and Intel have managed to do just that when it comes to commercial PC installations. The Wintel partnership, through its own dominance, has simplified at least one decision for the IS manager. In nine cases out of 10, he or she no longer has to choose between Wintel and another platform, but between which PC supplier and which version of Windows. They know that components are cheapest, skills are easiest to find, suppliers are most plentiful, and the greatest number of applications can be run on this platform, anywhere in the world. Any advantages a Mac might have in features or usability are dwarfed by the benefits of going with the worldwide 'standard'.

Without monopolies, standards need to be agreed on by multiple companies with competing interests. The goal of every business is to return a profit, and to look for ways to differentiate and gain competitive advantage. Sitting down at the table with progressively tighter by dropping concurrent-user rights and removing rights to install second copies for home use, for instance). We also tend to think of reduced innovation and lower quality (instability/more bugs in new releases) as a consequence of insufficient competition.

But the real downside of monopolies, the one which outweighs any positives, and the reason they can never be tolerated, is that they inevitably hurt the 'little guy'. Just as a dictator robs a dissident of freedom of speech, rights to travel and work, or even liberty, a giant in the IT industry can hurt a startup with a hot new product by pressuring partners and customers to drop it, by writing code to ensure the product runs poorly, or by simply stealing features for itself. Fact is, the big benevolent company which gets things done, still respect the rights of others, and refuses to abuse its power, just doesn't exist.

Bruce McCabe is Research Director for GartnerGroup.



Satisfaction

'I told you so' is possibly the most irritating and most satisfying phrase in the English language. It declares foresight, insight, superiority and, of course, tactlessness.

By Julian Ehrlich

ut 'I told you so' is but entree to the main course of 'what goes up must come down' — uttered smoothly, with an air of worldweary detachment, an attitude essential to hiding the eager anticipation of that rare but oh-so-tasty dessert, Schadenfreude.

English is lucky to be able to borrow so much from other languages, because, though all humans at some time feel that peculiar happiness at another's misfortune, only a language as precise as German could have a word to specifically describe that mean-but-oh-so-tasty emotional state. It extends from relishing residential peccadilloes to savouring the sound of crunching glass as a crass, rude driver of a flashy sports car loses one enaggement.

For MacBigots (I admit this weakness, dear friends), Schadenfreude is the rounded, full-flavour experience of reading about the travails of Microsoft.

Friends and critics alike will remember my repeated assertion that Windows 95 would be Microsoft's best vintage, a year when products (mostly) worked, in which 'power users' could mostly understand how Microsoftware functioned.

The frying pan of revenue sizzles still, well past Windows 95. But the heat is off. Microsoft is no longer cooking with gas.

The symptoms abound, evidenced by progressively greater resistance to market power. Resistance takes several forms: anti-monopolistic legal challenges which the US Government cannot avoid lest anti-monopoly legislation ossify; public campaigns to remove Windows from new computers and extract refunds; and the recognition of the evergrowing expense of trying to achieve stability in excessively complex systems and applications.

Microsoft's Pythonesque response to these challenges is astonishing. The press recently reported that Microsoft had resorted to fabricating a video to demonstrate the effects of removing Internet Explorer from Windows 98. Lawyers, not universally loved, can be relied upon to finetooth-comb an opponent's evidence. Microsoft got caught. Perhaps Microsoft should add the role of 'vice-president — evidentiary continuity' to prevent a recurrence?

Microsoft apologists argue that any market dominance is justified by innovations in applications and system software. The real problem is that the entire market must conform to Microsoft's definition of 'innovation'.

never learn more than say 50%, 30% or 70% of the individual applications' features. In this age of inter-organisational collaboration, producing, sharing, editing and reviewing documents becomes tortuous as fonts, styles, structures and all manner of little bits and pieces are incompatible between organisations. And that is if they are using the same release of a Microsoft product.

Perhaps you, dear reader, don't believe me. A test: Can you absolutely, reliably get something as trivial as page numbering to work in all Microsoft Office applications first time, every time? Who can? The year is 1999. Microsoft has been providing

The real problem is that the entire market must conform to Microsoft's definition of 'innovation'.

Windows 2000 has been reported to have 35 *million* lines of code. A statistic that means what?

A modern warship's fire control system ('fire' as in 'Aim . . . FIRE!') defends the vessel against 'inwards' and launches 'outwards'. A complex task. Such systems have 30 to 35 million lines of code. How can an ordinary desktop computer used for word processing, spreadsheets, Internet access and sorting lists ever need the same complexity and more millions of lines of code are yet to be added for word processing, spreadsheets, and so on!

This is innovation in volume rather than intellect. Bigger, more, grander and extra are not always better. What about more efficient, more stable, more predictable? I would really like commands that worked the same way in all applications, especially if those applications come from the same vendor. While wishing . . . how about settings that don't change themselves?

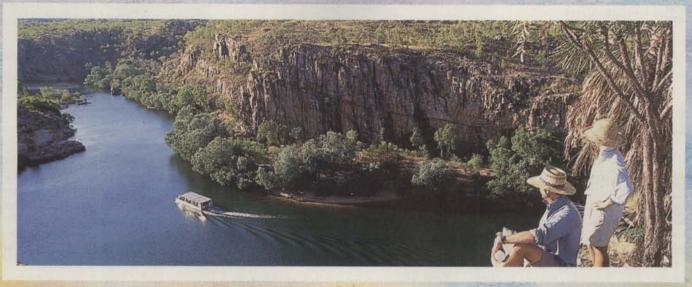
Functionality in Microsoft Office-related applications is now so great that most users

page numbering in various applications for how many years?

That is the practical, day-to-day consequence of market domination. Almost noone can produce an alternative because dirty deals between a dominant player and its dependent distributors and suppliers crush the small.

The resolution to the market domination problem, like AT&T, is to break up Microsoft. The value of AT&T plus the seven new 'Baby Bells' was very much greater than before the court-mandated break-up. A Microsoft broken up into say, Operating Systems, End-User Productivity Applications, Education Applications, Entertainment Applications, Development Tools, and Enterprise Services, would become even richer than it is today — but would not distort entire markets.

Microsoft will be broken up. If the courts fail, then Microsoft, like IBM, will break itself into truly separate divisions if for no other reason than to be able to manage its mushrooming internal complexity.



Above: A top view of Nitmiluk (Katherine Gorge). Below left: Snapped every day, by tourists.

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Videoconferencing is becoming popular, and the price of cameras is dropping accordingly.

Lights, cameras, action!

he use of videoconferencing is growing, and with it, the price of videoconferencing cameras is dropping sharply. You don't need to spend a fortune or fall back on second-rate technology — it's quite easy and cheap to send images and sound over the Web. Price Watch went in search of the cheapest videoconferencing cameras we could find.

The same cameras are also used in producing all the various Web camera sites on the Net, with everything from the Almost Amazing Turtle Cam (http://www.campus-ware.com/turtles/) to the University of Notre Dame Dome (http://lisa.ee.nd.edu/Dome Cam/) and several other and seedier (and probably more famous for that matter) Webcam sites. It would be worth checking with your ISP before setting up a Webcam site. Because it projects continuous pictures, you need a semipermanent connection at least, which isn't cheap.

Web cameras can enhance email and other communications a great deal. After all, there's nothing like being able to see the person you're communicating with, and most cameras come with a reasonable range of video software.

The broad trend in videoconferencing equipment is towards USB connectivity, and APC examined USB videoconferencing cameras last month (see APC March, page 116). The three cameras examined there were all recommended by the vendors Price Watch contacted, with a general preference towards the Logitech QuickCam Home. Only one of the vendors contacted could easily come up with a

non-USB solution when asked. Most retailers came in reasonably under the RRP of the cameras they suggested.

It was interesting to note the large number of retailers that didn't stock videoconferencing cameras. Most cited cost and demand as the main reasons. Of those who did stock them, however, most were reasonably aware of what their products could and couldn't do.

The salesperson at the International Software Warehouse was extremely knowledgeable, explaining what a USB port looked like and its advantages. He also offered other camera options when we inquired and pointed out that the alternative camera suggested (the Compro PS39) had night-vision capability, although he was somewhat at a loss to suggest a (legal) use for such a function.

The salesperson at City Software was keen to point out that a USB videoconferencing camera would automatically be compatible with iMacs and "virtually any Pentium II-based system".

On the less impressive side, the salesperson at Mail Order Software Australia assured us that the Kodak DVC323 would be able to send video and sound from one kit, which was incorrect. As noted in our review last month, the one drawback with the Kodak camera is the lack of an inbuilt microphone, which he assured us came with the pack. In a similar goof, the salesperson at Forte computers could only tell us that the Logitech QuickCam was "around \$250" but that it came with no software, and that another camera may be a better buy. He

then advised us to check the Logitech Web site in order to work out what the camera could do. While it's certainly a good idea to do a little research prior to making a purchase, it's not unreasonable to expect a salesperson to know at least a little about the products they're selling!

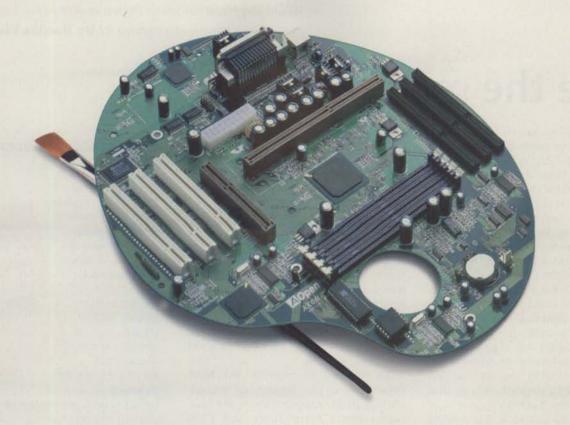
Overall, the cheapest option we found was the QuickCam Home Camera from Ecom Computers, although this was an OEM version lacking the normal bundled software. The staff were quick to point out, however, that for videoconferencing all that should be needed is Microsoft NetMeeting, which is available as a free download from the Microsoft Web site.

Our charter and method

Price Watch is an exercise in comparative technologies and relative prices. All investigations are conducted anonymously, and records are kept of conversations. Prices and system capabilities printed here are provided by the sales staff at the offices we contacted, and all information is as supplied. While we assume that these are correct, we cannot accept any responsibility for errors or omissions. Neither will we be held to account by companies mentioned here for omissions to product ranges or system capabilities. The responsibility rests with sales staff to provide adequate information, as the company would expect them to do with every customer.

Videoconferencing cameras

Company	Contact	Product	Price
City Software	1300 658 600	Logitech QuickCam Pro	\$279
Ecom Computers	(02) 9299 0022	Logitech QuickCam Home (OEM)	\$199
Forte Computers	1300 368 922	Logitech QuickCam Home	\$250 (approx)
Harris Technology	(02)99259925	Phillips PCA645VC	\$249
	http://ht.com.au/	Kodak DVC323	\$285
International Software Warehouse	1300 300 003	Logitech QuickCam Home	\$249
	http://www.software-warehouse.com.au/	Compro PS39	\$299
Mail Order Software Australia	(03) 9633 9111	Kodak DVC323	\$279
Performance Memory & Peripherals	(02) 9906 4533	Intel Create & Share USB Pack	\$414



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Would you buy a computer from a vendor which had a stack of complaints against it? By Roulla Yiacoumi

Take the money and . . .



ould you buy a PC from a shop if you knew that vendor had 100 complaints lodged against it? What if that number was

just 50? Truth is, not many of us would.

When buying a PC, potential buyers are strongly urged to take precautions before spending. But how do you avoid problems when no-one will tell you if the store you want to buy from is not everything it seems to be?

Service & Reliability often receives correspondence from readers who have tried to do the right thing and do a bit of research prior to making a purchase. "I called Fair Trading, but they won't tell me anything" is a common refrain.

The problem with consumer affairs and fair trading departments is that their interests don't always appear to be with the consumer at all. If you're going to spend \$2,500 buying a machine from a shop, aren't you entitled to know if that vendor has 150 complaints against it regarding the non-supply of goods? Of course! So why is it that a fair trading department cannot give you this information?

Fair Trading (the new name for some consumer affairs departments) is interested in just that: fair trading. If a vendor has had a number of complaints registered with the department, that information becomes confidential. Why? Because the department cannot be seen to be interfering with fair trade. By telling members of the public about any complaints, the department may be seen to affect that vendor's capacity to trade fairly - as any sensible consumer would more than likely take their business elsewhere. The other problem is that naming a business could be defamatory if the complaint is not proven.

Most vendors will have at least some complaints against them. You'll find that the number of complaints is usually relative to the size of the business. The bigger the store, the more likely that it has a greater number of complaints notched up. What you should be worried about is relatively new retailers clocking up hundreds of complaints in a short time.

Fair trading departments will issue notices warning consumers about dealing

with such places if the number of complaints reaches abnormal proportions. Unfortunately, by the time these warnings are published, several hundred consumers will have already been affected.

In October 1998, the NSW Fair Trading Advisory Council released its lengthy report, Inquiry into the Retail Supply of Personal Computers, Peripheral Devices and Software. It found that 57% of retailers which sold "problem computers" were no longer trading, including Empire Systems, Fairstar, Forem-Freeway and ShopSure. Over 30% of those who responded to the survey never received goods they paid for.

In the last 18 months, the NSW Department of Fair Trading has 'named' six high-profile computer shops, the most recent being Perry Tait's and CNN Promotions. Naming a vendor is a complex procedure and is considered very serious, as the vendor is sure to lose business as a result of the extensive media coverage. It only happens in very extreme cases.

Looking at this table, you can see that

VENDOR	COMPLAINTS			
Perry Tait's	560			
ShopSure	450			
Forem-Freeway	300+			
Fairstar	220			
Empire Systems	200+			

the number of complaints against a store can sometimes get ridiculously high before the department will officially warn the public.

Think laterally and do some research. A basic Internet search and newsgroup trawl will turn up some amazing results. And remember the fundamental principle of buying a PC: if the deal of a lifetime seems too good to be true, then it probably is.

Have you been caught out by a vendor which went out of business? Let me know, at ry@acp.com.au.

The Confident Consumer

What a great resource! This excellent book by Geoff Sirmai contains all the information you could want as a consumer. A variety of topics such as warranties, shopping tactics, refunds, faulty repairs, labelling, and bag searches

are covered. Specific areas such as computers, mobile phones, real estate agents, drycleaning and even funerals are discussed, with a bunch of real case studies thrown in for effect.

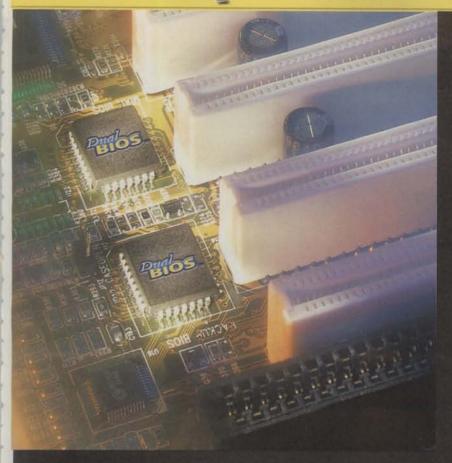
There are heaps of things in here that will have you saying "I didn't know that!"

Did you know that:

- 'Warranty void if sticker removed' and other such notices that exclude statutory rights of consumers are illegal.
- Faulty products do not have to be returned in their original packaging.
- If you have a faulty item which is covered by a warranty, it is the date that you report the fault that matters.
 If the warranty runs out while your goods are being shuffled between a retailer and manufacturer, you do not lose out.
- If a product with a 12-month warranty breaks down after 10 months, the replacement product has the same original warranty (12 months) — not the remainder warranty from the original purchase date (which in this case would be two months).

Every consumer should be armed with the information in this book. The Confident Consumer is published by Allen & Unwin and is available from major bookshops for \$19.95.

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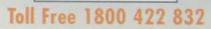
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A couple of extra inches on your monitor can cost more than you expect, especially if you are purchasing en masse.

Looking good

ot only do larger monitors

initially cost a lot more, but they also cost more to run over time. Obviously there are instances where it is advantageous to have a larger than standard monitor. The larger overall size of a 17in display, for example, allows for the possibility of higher resolutions, a greater number of colours and better overall screen displays. Thus those who work on graphic design and layout, play a lot of games, or use their computer screen as a television will benefit from the results. However, for traditional computer work, it is probably not worth the extra costs, said Alan Pears, director of energy consultancy Sustainable Solutions.

"There is a blow-out of people using 17in monitors," he said. "The staff think bigger is better and say they can be more productive if they have a larger screen, but I have seen no evidence of this being the case."

While the average 15in monitor consumes about 70W of power, a 17in display consumes 100W to 135W. "If you take a 17in monitor that is using 100W, and it's left on all the time, it will cost you about \$50 a year more than a 15in monitor," Pears said. "If it is only on during office hours, the cost would increase by about \$15. That may not appear to be much but when you are talking about an office full of systems, it begins to add up."

If your office is anything like that of APC, space is an issue. Finding the room for large monitors can be a problem, as can the extra heat generated when running a lot of them in a confined area. "Another 50W of power per system adds enormously to the heat load," Pears said. "That is basically another half a person's heat output each time you replace each 15in monitor with a 17in one."

Even those replacing only one system may need to think carefully about space requirements. If you are running a small home office you need to consider whether there is enough room for a larger monitor, keeping in mind that to ensure eye comfort, you will need to sit further away from the screen.

Pears also warned that the continued take-up of cathode ray tube (CRT)



monitors could have a detrimental impact on emerging screen technologies, such as flat panel displays, which consume less power but are currently more expensive. Obviously, market forces will have a large part to play in whether such technologies are successful, he said.

If you are convinced of the benefits of a larger CRT monitor, the US Environmental Protection Agency (http://www.epa.gov/) has some hints on how to keep power use and associated costs down.

With a larger system, it becomes more important to have a power-management system installed, and the EPA created the Energy Star Program in the early 1990s to provide a standard power-management environment. The EPA created partnerships with leading office equipment manufacturers in an effort to design and produce energy-efficient products. To meet Energy Star standards, a monitor, for example, must power down to no more than 30W when the equipment remains idle for a set amount of time — usually 15 to 30 minutes. To wake the system up, all you need to do is touch the keyboard or mouse.

Products that meet these requirements can use the Energy Star label. Monitors equipped with a power-management feature can save 60% to 80% of energy that would otherwise be wasted. The monitor will also then emit less heat and electromagnetic radiation.

The system has now been taken up in Australia, and most monitors (and other office equipment) meet Energy Star requirements. The New South Wales Sustainable Energy Development Authority (SEDA) notes that energy-efficient office equipment in the NSW commercial sector alone will save companies over \$25 million in energy costs a year, and decrease greenhouse gases by 100,000 tonnes.

In 1997, US President Bill Clinton noted in his climate change policy launch that if everyone bought one energy-efficient product and enabled its power-management capabilities, the total US energy bill would be cut by over \$100 billion in 15 years.

It is also sensible to turn monitors off, no matter what their size, at night and on weekends, as well as during the day when they are not going to be used for extended periods of time, according to the EPA Energy Star site. Most operating systems now also include power-management options that you may wish to explore.

Selina Mitchell

The Internet bubble is about to burst - as it was always destined to do.

Pop! Splat!



sst! Wanna good invest ment? It's this little Interne outfit a mate of min knows? The shares ar

going through the roof. Can't lose. Investors hungry for a piece of recen share market action have heard man variations on this theme, as Internet an telecommunications-related stocks hav headed for the stratosphere.

Such mad times happen every fev years and are a fascinating exercise in psychology and market dynamics. Fo people brave or foolhardy enough to b tempted into such short-term speculation it can occasionally be extraordinaril lucrative. At such giddy heights, however investing becomes little more than gamble.

Substitute Internet for tulip bulbs South Sea oil, nickel, cash box companies or railroad stocks, and you have some ide of what could lie ahead.

The more the world changes, the mor market behaviour remains the same.

The 17th century Dutch tulip bulb boom was followed quickly by the 17th century tulip bust. The Poseidon nickel boom of the late 1960s? If you don't remember, you can guess . . . excitement at new nickel deposits was followed by frantic bidding for nickel stocks. Poseidon shares hurtled to \$268 on the ASX, and then crashed.

Burned into the psyche of more recent investors is the crash in the late 1980s, after tiny cash box companies rushed to float, chasing capital to develop everything from automatic ironing machines to obscure hardware and software.

Until recently, Australian investors showed more restraint than their US counterparts. Recent figures show that investors who have bought Australian telecommunications, technology and media stocks over the past year have earned a better-than-average return.

According to InTech Asset Consulting, Australia's sharemarket posted a reasonable 13.1% rise in the year to January 31. Industrial shares have returned a healthy 20.4%, while resources stocks have been a big loser over the period, showing a 15.3% decline.

The telecommunications sector led by a



staggering amount. Over the year, telco stocks gained a stunning 82.2%, well ahead of the next strongest sector, alcohol and tobacco, at 51%. Aside from the spectacular success of Telstra shares, which more than doubled in value, were the extraordinary performances of One.Tel, AAPT and Vodafone subsidiary Mobile Communications, and floats such as Cable & Wireless Optus and LibertyOne.

Somewhere the madness crept in. A proposal by Publishing and Broadcasting Limited to float its fledgling NineMSN Internet division sent its share price rocketing. A string of smaller float proposals or takeovers have sprung from the pile. Yes, Internet business is growing fast but the fanciful prices touted have been based more on a desire by big companies not to miss out on the action, rather than analytical rigour.

Larry Williams, chief executive of listed carrier AAPT, summed up the madness in February when AAPT scooped up the remaining stake in Internet service provider Connect. He joked that he should change AAPT's name to Connect to better reflect the growth profile of the industry.

Normally, examination of a listed stock's price-to-earnings ratio (the price of the share relative to the actual or forecast profit on each share) gives a reliable lead o the growth prospects for that stock. For ome time now these have been marked ip to ridiculous levels.

Telstra is one example. Brokers have oitched it to overseas clients as an Internet tock because it owns ISP Big Pond. As a esult, it is trading on a prospective 1999 rice/earnings ratio of 34 times, compared vith a market average of 19. It is even igher than that of similar telcos in Europe. Other Internet-related stock which won't see profit for a long time, even on optimistic issessments, show more fanciful ratios.

At this point the thoughts of New York nanagement consultant Joel Stern of tern Stewart & Co may bring a few nvestors back to earth. Stern specialises in neasuring the financial performance of isted companies. He recently observed hat the difficulty for investors was that nodern accounting standards hadn't aught up with the virtual economy.

Stern's assessment is that the Internet bubble will burst this year - sooner rather than later. His recent sober prediction to financial media was that up to 75% of the value of Internet stocks would evaporate when the market turns.

Buying in at such market heights is only for the extraordinarily brave, or the stupid. The very risk is what makes the market exciting.

Telecommunications and the Internet are a world-changing phenomenon, just like the development of the telephone, television and the parallel emergence of the steel industry and railroads.

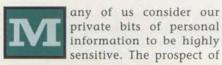
One of the formative figures in the latter half of the 19th century, steel titan Andrew Carnegie exploited innovation to slash steel prices, which in turn made it cheaper and easier to connect cities by rail. Carnegie turned up his nose at conventional wisdom's suggestion you should diversify your investments. "Put all your eggs into one basket," he once advised, "and then watch that basket."

Few of us have the market power of Carnegie. Conventional wisdom is sound, even on the cusp of the new Internet economy. Don't hand over all your eggs, unless you want to lose the eggs and probably the basket as well.

Jessica Stuart

To be effective, privacy legislation must keep pace with developments in information technology.

Protecting our private bits



others obtaining those private bits is unwelcome to say the least. This personal desire for data protection and the increased threat posed by information technologies to data privacy has led to a renewed push for data protection laws both in Australia and internationally.

This push is not new, however. The Organisation for Economic Co-operation and Development (OECD) was discussing such matters in the late 1970s, when Australia's Honourable Justice Michael Kirby was chairing the OECD Experts Group on Privacy.

A decade later, the Federal Government recognised the need for limited data protection measures and introduced the Privacy Act. This regulated Commonwealth and ACT agencies which processed personal data, and private sector entities which used tax file numbers and consumer credit information. The private sector was left to use personal data the way it chose. The boom in information technologies and data processing, however, has revealed the need for far greater privacy laws.

The European Union was the first to comprehensively respond to the increasing threat information technology presents to privacy in both the public and private sectors. In 1995, it issued the Data Protection Directive. By October 1998, all member states had enacted legislation modelled on the directive.

Legislation modelled on the directive — for example, the UK's Data Protection Act — regulates the manner in which personal data (for example, name, address, occupation) is processed. The UK act also prohibits, with some exceptions, sensitive personal data (for example, data about racial or ethnic origin, political opinions, health or mental condition, and sex life) which is processed in the UK. The UK Privacy Commissioner administers the act, ensuring that it is applied consistently across all industries and in both the public and private sectors.

Two important features of the UK act are the provision of criminal penalties for

infringement and the right of an individual to claim monetary damages if she or he suffers damage as a result of an infringement of the act. Importantly, Britons can enforce their privacy rights in a court, as well as seeking assistance from the Privacy Commissioner in enforcing their rights. These are strong measures that reflect what commentators see as the human rights aspect of data privacy.

The EU directive is extremely important from Australia's point of view, as it generally prohibits data processors in the EU from transferring personal data to a country outside the EU unless that country provides "adequate protection" for that data. This prohibition will impact on Australian businesses that rely on such data transfers.

The directive caused Australian governments to take action. Victoria was first off the mark, releasing its Data Protection Bill, modelled on the Australian National Privacy Principles (NPP), last year. The Federal Government followed Victoria's lead by committing itself last December to introduce a national 'light touch' data protection bill, based on the NPP.

The bill is built around a selfregulatory model which allows individual industries to adopt their own privacy codes. It will only apply if an industry code is not adopted. The freedom given to industries to implement their own codes is a great idea. Obviously, applying the same standard across all industries has the potential to cause inefficiencies. Different industries may set standards higher or lower than those set out in the bill. This will ensure that data privacy is protected in an efficient manner. Certain safeguards are in place, however. The Privacy Commissioner must approve all proposed codes. If industries propose a code that unjustifiably attempts to water down some or all of the data privacy obligations, then presumably the Privacy Commissioner will not approve that code.

The strength of penalties that may be provided under the codes, and the issues of independence that naturally occur in the context of self-regulation, are also causes for concern. While some may suggest that it is more efficient to ensure the courts have no role under data protection laws,

some may argue that a right to apply to a court to enforce their rights under data protection laws is essential.

Deacons Graham & James believes that if the states, territories and the Federal Government can work together and enact a national scheme, Australia will provide appropriate, consistent protection for personal data. It is highly likely that such legislation would satisfy the EU's data transfer rule. This will only be the case, however, if the EU considers Australian laws to be somewhere in the ballpark of acceptability — not sitting alone in the bleachers.

While business should not be burdened by heavy-handed data protection laws, it must be subject to laws that provide an appropriate level of protection for what Justice Kirby refers to as a fundamental human right, personal data privacy.

Leif Gamertsfelder is an IP/IT lawyer with Deacons Graham & James.

Links

- Privacy Act 1988 Commonwealth http://www.austlii.edu.au/au/legis/cth /consol_act/pa1988108/
- Data Protection Bill Victoria
 http://www.vic.gov.au/stategov/dbills
 .html
- European Union directive on the protection of individuals with regard to the processing of personal data and the free movement of such data. http://www2.echo.lu/legal/en/dataprot/ directiv/directiv.html
- For an example of legislation modelled on the EU Directive, see the UK's Data Protection Act 1998 http://www.hmso.gov.uk/acts/acts1998/ 19980029.htm
- National Principles for the Fair Handling of Personal Information (revised edition) http://www.privacy.gov.au/publications/index.html
- For criticisms of the position on data privacy, especially regarding selfregulation http://www.epic.org/privacy/intl/

rotenberg-eu-testimony-598.html

It's still to early to tell whether Gigabit Ethernet will dominate networking.

Leap of faith?

ince networking vendors began developing Gigabit Ethernet products in 1996, the industry has been abuzz with speculators trying to answer the big question, will it be ATM (asynchronous transfer mode) or Gigabit Ethernet that eventually dominates corporate networks? While ATM is now increasingly appearing in Australian networks, the ratification of a Gigabit Ethernet standard in June has seen several companies adopt the technology and many others giving Gigabit Ethernet consideration when formulating networking strategies.

Although it provides blistering transfer speeds of up to 1,000Mbps, Gigabit Ethernet's infrastructure requirements throw a good-size spanner into the plans of companies that believe vendors' marketing rhetoric that the technology is easy to install. While it shares the CDMA/CD collision detection and variable-length packets of Ethernet and Fast Ethernet, Gigabit Ethernet is actually an amalgam combining Ethernet's data structure with the physical transport layer of Fibre Channel (a high-speed, fibre-based server interconnect protocol).

The unique design of Gigabit Ethernet, and the inevitable signal attenuation that its high speeds cause on copper cabling, limit its deployment - even over Category 5 cabling — to short run lengths that are only adequate to link servers in the same room. Single-mode fibre is for all intents and purposes mandatory for Gigabit Ethernet, meaning that companies without a significant fibre infrastructure may find ATM provides a better short-term solution, as speeds of 155Mbps can be achieved running ATM over copper. Even in larger companies and government departments with fibre backbones, however, IT managers are hedging their bets by retaining upgrade paths in either direction.

Broadcasting company SBS, for one, has used Xylan's recently released OmniSwitch Router to implement a Gigabit Ethernet network supporting nearly 800 devices in Sydney, Melbourne and Canberra. After running the Gigabit switches in conjunction with a separate Fast Ethernet network, the company will completely switch over to Gigabit, but it is keeping ATM in mind for future multimedia applications.

"We've got plenty of fibre, and when it was time to change from our 10Mbps network, it made no sense to be looking at 100Mbps Fast Ethernet with Gigabit Ethernet now available," said Charles Shave, deputy manager of computing and network systems at SBS.

"Gigabit also made more sense in a data network than ATM, which is just a very complex way of getting data from one side of the network to the other. However, in audio and video production, it's more likely that people will produce true ATM software [written specifically to take advantage of ATM's quality of service

a year, communications manager Brad Eyre said Fast Ethernet was more than enough for its 4,000-node network at this point. For future flexibility, however, DAFF chose modular switches (Cisco's Catalyst 3500s) because they support both ATM and Gigabit Ethernet.

"Similar to 100Mbps Ethernet, Gigabit Ethernet is quite easy to install," said Eyre. "ATM is quite complex, particularly if you have 36 switches as we do. Gigabit was more expensive than ATM and we didn't believe [155Mbps] ATM gave us a lot of advantages over 100Mbps Ethernet. However, if you've got huge traffic problems, you'd have to carefully look at Gigabit Ethernet over ATM. In a LAN environment where you're only pumping

IT managers are hedging their bets by retaining upgrade paths in either direction.

technology], and there's a perception that we'll need to use ATM for that later on."

Although the large volumes of Ethernet and Fast Ethernet already sold have pushed them to commodity price levels, Gigabit Ethernet's relative youth means it is still more expensive than ATM solutions. On the other hand, the fact that ATM is completely different from the Ethernet family means that ATM implementations not only require the capital cost of equipment investment, but also the acquisition of skilled engineers to implement and maintain them.

Recognising that both technologies have their drawbacks, many companies are shying away from switches that only support one or the other. Modular switches, which allow companies to swap topologies by simply changing interface cards, were a key requirement when the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) in Canberra was planning for its recent network upgrade.

DAFF decided 100Mbps Fast Ethernet would be an adequate stopgap until Gigabit Ethernet or ATM became necessary. Although the department has run a Gigabit Ethernet switch in its National Residue Survey supercomputing centre for nearly

data, Gigabit Ethernet is fine. We wanted a chassis that could provide us with a migration path to both technologies."

Gigabit Ethernet also faces some practical obstacles, including the fact that few of today's servers are capable of handling even one-third of a gigabit of traffic. Since similar results can be obtained by using 155Mbps ATM connections and a 622Mbps ATM backbone, many companies may find that high-cost Gigabit is still less than compelling.

A recent Gartner Group analysis predicted that Gigabit Ethernet will come into its own around 2000, and that revenue from Gigabit LANs will surpass ATM LANs in 2001.

For now, companies shouldn't sweat over Gigabit, said David Keane, Australia/New Zealand managing director of switching vendor Xylan. "[Gigabit Ethernet is] just the merging together of existing technologies into a new one that makes sense. I can see the market going to Gigabit Ethernet for traditional LAN applications in the next year, but let's not give it more importance than that. It's good to have, but it doesn't solve customer problems [such as quality of service and user administration]."

David Braue

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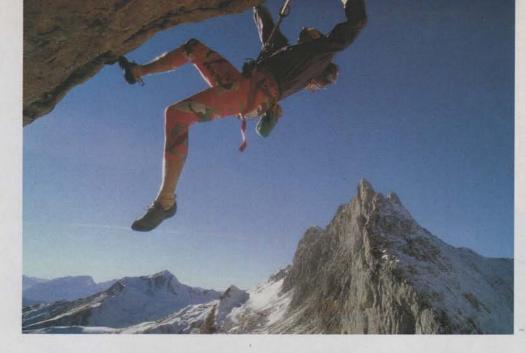
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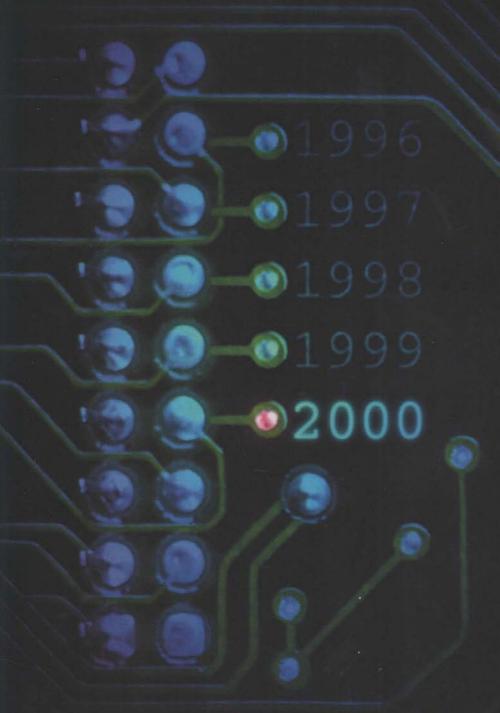
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ZERO BY SIMON VANDORE

Analysts agree that Australia is well ahead of the pack in tackling potential computer problems centred on 2000. But being in front is not necessarily something to crow about — there's still a long way to go before anyone can dare to smile. None of the numbers are anywhere near 100% yet, and even those whose repairs are 'complete' won't give any guarantees. And then there are the external factors . . .

In reality, many countries are just starting their Y2K efforts and may not be ready until 2001, let alone the end of this year. It's said that even some First World nations are so far behind that they have already decided to sit tight and see what happens. Considering the fun could begin even earlier than September, when the date 9/9/99 will be seen by a considerable number of programs as an 'end of file' marker or termination instruction, economic effects may be inevitable.

Y2K is real. Problems with the date change occur with varying frequency in everything that uses microchips. Calculations involving dates where the year is represented by two digits do not work when the century changes, and this century we have become accustomed to using two-digit years everywhere — in handwriting, on calendars and in the computer industry. Windows 98? Didn't they mean 1998?

The question is whether Y2K is going to hurt us a little or a lot. Each individual and organisation has to decide whether, and how much, to believe the naysayers and doomsayers, and then react accordingly. If a significant number of computers and applications lose their ability to measure time or crash due to invalid data, does it really matter? There will be plenty that continue to function normally. There will be plenty of people with workarounds. Computers have only really been important for 20 years — surely our dependence isn't so extensive that we can't do business or run our lives without them?

Perhaps the answer is that we're not dependent, but have simply, perhaps carelessly, placed too much trust in technology's enabling power, allowing many of the alternatives to rot. We all trust technology to varying extents. We trust it to keep us alive in hospitals, prevent traffic accidents, and design other items on which we rely. We also use it to buy, sell, organise and distribute everything bankable, wearable, edible, editable and generally obtainable. Temporarily losing parts of that infrastruc-

"The question I ask is, 'Is this the sort of thing that you really want the rest of the world to put the benchmark on?' So I think we've got to be very careful — congratulating ourselves on being the leader is probably not the way to do this. As I often say, you can just as easily drown in 10cm of water if your nose is under it, as you can in 3m of water," Inchley observed.

"My opinion is that it will certainly emerge as a 1999 problem, because if you think it's all going to emerge on 1/1/2000 then you're kidding yourselves. The number of event horizons that will emerge during 1999 will just increase as we go through the year — travel bookings into the year 2000, the financial year starting on 1st July. The 90, 60, 30-day forecasting systems that one might have as you get closer to the year 2000. All of these things — insurance renewals, for example, any other renewal, a licence renewal that's being done on an annual basis — if it's going to pick up a year 2000 problem, it's more likely to do it then than in the year 2000.

"There may even be backward referencing in the year 2000 and beyond, so then you've got systems that having looked forward into the year 2000 and learnt to cope with that, now that we're in the year 2000 we have to back-reference into the 1900s for birthdates or whatever. Who knows?"

Senator Ian Campbell's lengthy title is 'Parliamentary Secretary to the Minister for Communications, Information Technology and the Arts, Senator Richard Alston'. But Alston has given him full-time responsibility for handling everything connected with Y2K, a task which will clearly put him in the spotlight towards the end of this year. Only a few months into his role, Campbell is already fluent in the language of Y2K and has obviously done his homework.

"I've seen my job in the first three or four months as being able to get as good a feel as possible for the preparations that are being made across Australia at all levels, and I think I'm coming to the end of that process," said Campbell.

"I'm looking at making sure we get government coordination at the best level and the Industry Program and the communications strategy are all on track. We're making assessments of the international situation at the moment . . .

world. Congratulations. Let's panic.

ture could force a major rethink, but not before it creates havoc. At worst this havoc, or even just the thought of it, might interrupt supply and even cause social unrest, but surely not in Australia?

The feds

Even the Federal Government's year2k Industry Program, responsible for alerting and advising Australian business about Y2K, refuses to take comfort in the local percentages. Its CEO, Graeme Inchley, determinedly avoids resting on his laurels.

"The bits that concern me are, I guess, the small-tomedium enterprise sector broadly. I don't want to pick on them, but I'd take every opportunity to ask them to if they haven't done something about it, then don't delay it till tomorrow.

"All of us like to put things off until tomorrow if we can, but [Y2K is] something that should not be seen as some bizarre, Nostradamus type thing — it should be seen as a business continuity issue. It should be seen as something like the Asian crisis, or it should be seen as if you've got a major new competitor coming in. How do you react to it?"

Industrial disease

Small-to-medium enterprises (SMEs) are indeed the most worrisome sector for Australia. Such companies are said to contribute \$125 billion to Australia's gross domestic product (GDP) and employ around 3.6 million people.

At the start of last year, statistics from the Australian Bankers' Association (ABA) showed only 20% of small organisations

took Y2K seriously. Fortunately by December, preliminary data from a survey of 6,500 businesses by the Australian Bureau of Statistics (ABS) showed a 100% increase for small business and a 70% increase in activity among medium-size firms. Awareness was very high (90%), but the statistics referred to action, not completion, and just 60% of all companies expressed an intention act. Most of those with no intention had

fewer than five employees.



Inchley said smaller companies — "by that I mean three, four, five people in a company, up to a dozen" — were still within target range if they acted on Y2K in the first half of 1999.

"In those cases it may be that a software upgrade is an answer. It might take a week or so, or not even that. It might be that they have to do a bit more, or that they don't have to do anything. But they need to take that action."

Meanwhile, the importance of revealing information about readiness cannot be underestimated. The ABA has warned that as 2000 approaches, SMEs which have not addressed millennium bug issues may be seen as poor credit risks.

Smaller companies are still within target range if they act on Y2K in the first half of 1999.

Last year, the Australian Stock Exchange (ASX) required its member companies to report their Y2K readiness by June 30 at the latest, and it will do so again this year. It's no coincidence that the chairperson of the year2k Industry Program, Maurice Newman, also chairs the ASX.

Newman pushed for the recent passage of 'good Samaritan' legislation through Federal Parliament, to limit the liability of those responsible for disclosure of corporate Y2K information from prosecution for their statements, while prohibiting anti-competitive action arising from Y2K statements. The legislation, dubbed 'The Year 2000 Information Disclosure Bill 1999', was passed by the Senate on February 18 and only excludes statements which are demonstrably

misleading or made as part of legal proceedings. It does not protect companies against the failure of a product or service due to Y2K-related factors, but this was never its intention.

"We need the major infrastructure suppliers — telecommunications, electricity, water, transport, banking — by the middle of this year, anyway, to be very clear about what their status is and what they forecast in terms of business continuity . . . They've got to be absolutely honest, and by then they've got to have some feel for the potential. And then we base our recommendations on that potential." explained Inchley.

Deloitte Touche Tohmatsu analysed Y2K reportage from the ASX's top 150 companies last financial year. Its analysis showed that 29% expected to be compliant by the end of 1998, but 10% thought it would take until the last half of 1999. Some believe that the mere fact that 15 very large companies are placing themselves at such a risk presents a threat to the national economy. For example, in May, a survey among members of the Australian Retailers Association showed that 80% regarded Y2K as serious and a full 14% had already run into problems.

But even last December, ABS data showed 10% of businesses with 200 or more employees were yet to start work on Y2K.

Philip Dodd, marketing director of the year 2000 program for Unisys Australia and Asia, said, "Organisations that started two or three years ago said to me then, 'If you haven't started you're not going to finish'. Then! Two or three years ago. And these were big organisations, multibillion-dollar organisations, the big banks mainly. And they did start early, and that's great. They are part of the infrastructure that supports all of us. But if an organisation of that size has not started, then they'll never finish — the good news is that there are very few of those around the world, and they're not in this country."

A comparision of the states showed the ACT had the most Y2K activity, while Tasmania had the least. Some specific industry sectors and states, such as the Victorian retail industry, appeared to be doing far less than their counterparts in other states.

"I don't know why," admitted Inchley. "I don't think it's anything to do with the Victorian program. Maybe it's that Victorian retailers are an especially conservative bunch . . . But we need to understand why that's the case."

Sorting the ABS results by industry sector showed mixed results. There was strong activity in the wholesale and finance sectors, and slightly less activity in the construction and hospitality industries, for example. Preliminary results from private utilities (water, electricity, gas and so on) showed 86% were taking action. The other 14% were regarded as not dependent on IT. However, at press time no statistics had been released for public utilities.

Individual state governments' preparedness varies, but the Federal Government has been releasing reports on its Y2K status for about a year and a half. Until recently the reports referred to broad sectors of government activity, but the most recent one



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Panic merchants

For some people Y2K is a wonderful thing. It's been a goldmine for mainframe COBOL programmers. Once considered industry dinosaurs, they are now the most soughtafter computer professionals in the world—they are the only ones who can fix the mess they left. Companies involved in the awareness, repair tool and consultancy businesses are doing pretty well too.

It's also terrific ammunition for conspiracy theorists. Could it be, for example, that those COBOL experts and other programmers deliberately created non-compliant software to give themselves a nice little nest egg to retire on? Then there are those who think Y2K is an exaggeration — the perfect way for technical people to scare computer illiterate financial controllers into loosening the purse strings. Others think it is a plot hatched by powerful Western governments that can afford to fix the problem, in an attempt to hamper the growth of developing nations by maintaining a technological advantage.

But most of all, the intertwined confusion of a new millennium and a computer problem is a tasty treat for doomsday prophets and cults. Throughout history, the turn of a century was always seen as a time of uncertainty, but the turn of the millennium seems to be causing many to lose their capacity for rational thought and expect catastrophe. Beyond the partying on New Year's Eve will be many groups expecting the return of Christ, alien landings, or the collapse of civilisation as we know it.

Sooner or later, anyone exploring the Internet for Y2K information will come across Dr Gary North (http://www.garynorth.com/), nicknamed 'Scary Gary'. On the surface, his huge site appears to



offer a well-informed analysis of Y2K and as a result, he is regularly quoted in articles as an expert, thus influencing worldwide opinion. One of the top-selling books on Y2K, Edward and Jennifer Yourdon's *Time Bomb 2000* (http://www.yourdon.com/), was allegedly written with some input from North, who believes Y2K will be "catastrophic".

"I'm saying that it's over. Right now. It cannot be fixed," wrote North. "The domino effect of a computer-driven breakdown in supply delivery systems, including the means of payment (banks), will be huge."

But North appears to have an agenda. He has predicted Armageddon in the past — in 1980 he forecast nuclear war between the former Soviet Union and the US, and for years he has published a well-

subscribed apocalyptic newsletter called *Remnant Review*. His site is brilliantly parodied at http://www.garysouth.com/, while strong evidence of his ulterior motives is presented at http://www.smu.edu/~acambre/garynorth.htm.

North's reply: "If my critics want to create their own Web sites filled with 'it's not going to be all that bad' evidence, they may do so. I am unaware of any such site on the Web today."

Beyond doom and gloom are the US survivalists, acting on extremist claims that Y2K will cause shortages and social unrest so great that those who have prepared for the crisis and moved to a recommended rural retreat will have to defend themselves against refugees from the city. Even a real estate agent in northern Washington is marketing

reports portfolio by portfolio, the way Cabinet has received its Y2K information for the last 18 months.

The states have met regularly with the Federal Government and on December 17 last year agreed to report at the same time and in the same format. It's easy to be cynical and presume the politicians are uninformed, reaching consensus by just going with the flow, but Campbell believes all governments now recognise the challenge.

"I think that's a tremendous step forward. I think that in my time in politics I've never seen state and federal governments cooperate so brilliantly on an issue," he said, admitting this was an issue with no precedent and little likelihood of recurrence. Campbell is "fairly confident" the Fed-

eral Government will be ready to report its Y2K readiness by June.

Scenarios

So, what exactly does the bug do? Is it simply a matter of a few computers going down? How can that possibly damage the economy, your income, your daily life? The prophets of Y2K like to give examples in context, Here are three:

You are a consumer. You wake up on the morning of January 1, 2000 with a hangover and fill a glass with tap water. Something's clearly gone wrong in filtration — it smells of chlorine and is undrinkable. You walk to the corner shop to buy mineral

properties with the line, "Y2K is not a concern to us in Pend Oreille County. Come and relax!" (http://www .northcountry-realty.com/).

At http://y2ksurvive.com/ and http://y2ksurvival.com/, you can find instructions on how to stockpile food, water and ammunition — one site even advises that bullets are an investment which can be sold after the crisis at a profit, if not used. Dozens of sites have sprung up offering food storage packages, such as http://www.y2ksupplyco .com/ and http://y2kfood.com/.

In its January 18 issue, Time Australia published interviews with computer professionals who were heading for the hills, buying electricity generators and seeking out caves for shelter, supporting North's assertion that technologically savvy people will exit the cities throughout 1999 as they realise the only solution is to run from their

Such beliefs are spreading to prophetic revivalist movements in Australia and New Zealand. For example, at http://www.om .com.au/y2koz/homepage.html, Byron Bay theologian Phil Mason's extensive Y2K site asks, "Is the writing on the wall for Modern Bablyon?", while the New Zealand Revival Bulletin, http://crash.ihug.co.nz/~revival/, awaits millennial events that will bring us to our knees.

As 2000 approaches, prophets of doom will no doubt receive mainstream media coverage and gain a following. Perhaps the best way to take a reality check is to go to http://www.erols.com/steve451/doom.htm, a long-established site run by Steve Davis, to whom Gary North once wrote: "Of course I want to see Y2K bring down the system, all over the world. I have hoped for this all of my adult life."

Simon Vandore

water and see a long line of customers. The staff are trying to prise open their cash register to get change - it just won't do anything it's supposed to. Outside in the morning sun, the street lights suddenly switch themselves on. Their automatic timer switches them off in the evening, and in the darkness four people are mugged for cash, which is getting scarce nobody can find a working ATM.

2. A company makes and sells furniture. Its timber comes from a supplier across town. On January 3 an expected shipment fails to arrive. The boss has to drive over there anyway, so he calls into the warehouse. Huddled around the front desk computer are several stressed employees — their computer seems to have lost all its records and they don't know anything

about the shipment to the furniture company. Entering its name causes the supplier's computer to print several overdue bill warnings, even though the boss knows he's paid up to a week ago. It thinks the most recent bills are 99 years overdue.

3. A diplomat is due to fly to the US. He's an hour late getting to the airport - every second set of traffic lights was out. He gets to the airport and discovers his flight is also delayed, so he rings a contact at the airline. When will the plane be leaving? Nobody's quite/ sure. Pilots crossing the Pacific report that air traffic control is nonexistent. After a few near misses the airline desperately needs to plo a new route, but it's nearly imposs? ble to string together enough safe air space. The diplomat loosens his tie - the airport's airconditioning has failed.

You get the picture. But while there will be problems along these lines in disparate areas and they may affect you, most of the above examples are now quite unlikely, as the organisations involved will have taken precautions to prevent them by now. Companies such as banks, airlines and water treatment facilities are considered to have a high awareness and the resources to act - the most likely example above is the second, involving a supply breakdown between two SMEs. But mainstream insurance companies still won't insure against Y2K.

Many Y2K problems are deadly serious — it has been claimed that up to 80% of NSW hospital equipment (defibrillators, ventilators, and ECG and ultrasound machines) will require replacement or upgrading before 2000 — but other date-related errors simply cause amusement . . . and paperwork. In the US, for example, a 101-year-old man's car insurance premium was automatically tripled because a computer decided that he was a high-risk young driver at the age of one, while a 104-year-old woman received a letter notifying her that she was enrolled in kindergarten, having turned four.

You may find your own home PC has a few problems after 2000. Some of the older programs might not work properly, or if it's an older PC you might find it thinks the date is 1900 or 1980. But it's unlikely things will cease altogether, and none of this will be disastrous - unless the PC is used for business, in which case you need to figure out some workarounds or upgrade the software and equipment well in advance. This is especially important if you rely on spreadsheets, because calculations using two-digit years are a real danger which may even remain with you once all your equipment is compliant — the devil is in the data.

Contrary to popular opinion, the Apple Macintosh is not immune to Y2K problems. Although it doesn't have real-time clock (RTC) or BIOS issues, it is as susceptible to programming problems as any computer, as are Unix-based systems. On the other hand, unlike

Senator Ian Campbell is responsible for the Federal Government's Y2K plans.

Microsoft Windows, Unix variants and the Macintosh do not have significant Y2K problems at the operating system level.

Consumers and SMEs will no doubt be bombarded with advertising by Y2K repair tool companies for the rest of this year. There is no perfect solution, but the most popular applications are reasonably helpful if you're not sure where to start. Beware of the number of simple BIOS fixes and realtime clock checkers that claim to provide a full year 2000 solution, but which may actually be addressing only about 1% of the problem. If you buy a program that claims to find and help you tackle all the problems on a hard drive, be sure it's the right one for the job and that you're not wasting time on things you don't really need to fix.

Graeme Inchley warns: "Year 2000 readiness is predominantly contextual. In other words, it depends on the circumstances in which you are using the software or the product, whether it's going to be ready for the year 2000 or not, and indeed whether it matters. So whether a piece of word processing software is 2000-ready or not is not nearly of the consequence that, say, a piece of accounting software might be, simply because of the context in which it's being used.'

Continuity

Crisis management skills will be vital to minimise the impact of any Y2K disasters on any group in business or society as a whole. Such events will be more easily dealt with if all the possibilities are considered in advance, with harm-minimisation strategies mapped out as a priority.

Just 13% of companies surveyed by the ABS had done any contingency planning, and a mere 20% had any concrete information about the readiness of their suppliers and customers. Companies need to plan alternative avenues of supply and distribution, while keeping an eye on the rest of the world whether on overseas suppliers or the situation in general

"[Interconnectedness] is not something we should be afraid of," said Campbell. "The more we're interconnected the more prosperous we're going to be but because we are [interconnected], what happens in South-East Asia or other parts of the world is going to have an impact on us . . . parts of the world that international consultants tell us are behind the eight ball. I suspect in many of those places the fixing up of Y2K problems could take a long time. It could take a year or a couple of years, although you're stabbing in the dark guessing at these things.

"We'll do whatever we possibly can within our resources to help our neighbours. We will be good neighbours, good Samaritans, because it's very much in our interest to make sure our trading partners get through this and that we can continue to trade."

Expert opinion varies on the likely impact on this country. British Y2K guru Karl Feilder has predicted a few of years of serious interruptions from 1999 to at least 2001, and he's not alone. Slightly more con-

Useful contacts

New South Wales Year 2000 http://www.y2k.gov.au/

Y2K Register

http://www.y2kregister.com.au/

Institute of Engineers Y2K

http://www.ieaust.org.au/v2k/

Y2K News Magazine http://www.y2knews.com/

2000aware

http://www.2000aware.com/

vear2k Industry Program Phone: 1800 11 2000

http://www.year2k.com.au/

The Year 2000 information

http://www.year2000.com/

The Millennium Problem in Embedded Systems http://www.iee.org.uk/2000risk/

Taskforce 2000

http://www.taskforce2000.co.uk/ contingency.htm

servative is Peter Wright, vice-president of systems delivery practice for DMR Consulting Group, who predicts an 'exposure period' for Australia of four to six weeks from January 1. The economic impact could be severe.

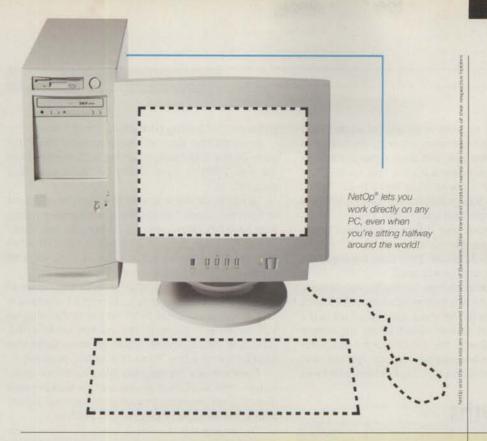
"Remember the gas problem we had in Victoria?" asked Wright. "That was a very good indication to say 'What if the embedded systems in the pipeline didn't work and the electricity didn't work and things like that?'. As I understand it the economic impact of that was \$50 million a day. So in industry they were talking about closing down, saying take extended leave. So that's something to consider, and remember that \$50 million a day was only in Melbourne. You can imagine the effect across the world."

Other examples include the Auckland power crisis and the Sydney water scare — both problems not only inconvenienced millions, they cost hundreds of millions of dollars.

"What you can actually determine from the event is how long it takes for that business to recover and get back to normal, and what the impact is on other businesses," said Wright. "Four to six weeks I think is the impact period where organisations need to be extremely aware of what's going on and possibly have contingency plans to say 'Well, how would we survive that?"

Personal contingency plans are also being discussed. The Red Cross in the US, for example, has released a list of preparatory measures (http://www .redcross.org/disaster/safety/Y2K.html) which treat Y2K as something akin to a natural disaster: "Be prepared to relocate to a shelter for warmth and protection during a prolonged power outage . . . Stock disaster supplies to last several days to a week . . . As you would in preparation for a storm of any kind, have some extra cash on hand in case electronic transactions involving ATM cards, credit cards, and the like cannot be processed . . . "

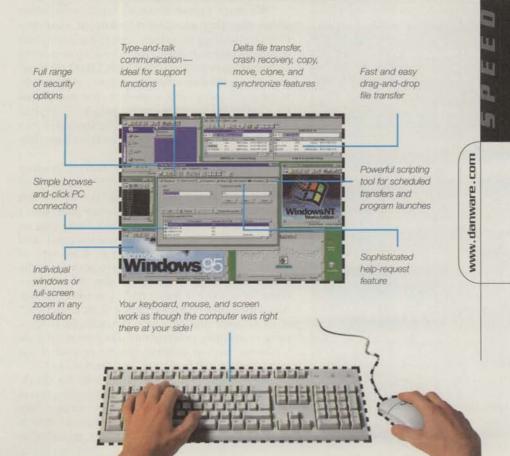
"We've got to put this in context," explained Inchley. "If you live in Canada, or . . . if you live in Darwin and you have been subject to reasonably regular cyclones over the years, it is second nature for



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The fine art of Remote Control

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the people there to have a couple of weeks' food stored. Because it's common sense to do that in a zone where not just Y2K, but these natural disasters can occur. The issue here is it's not that special. You do it because that's the sensible thing to do. So the context in which that particular recommendation is made has to be very well understood."

"Look at America and Europe," suggested Dodd.
"Far greater population density, middle of winter, and in some cases 30 below. That's not the time that you want to run out of power or oil.

"In the Australian context, it's the holiday season, it's hot — we're not going to be worried about that stuff, and we won't have to. We're not quite as reliant as the higher population density countries on the supply chains of food delivery. We don't have the complications of multiple telecommunications systems that they do . . . Australia and New Zealand are pretty well

Top 10 Y2K myths

1. THE MILLENNIUM DOESN'T ACTUALLY START UNTIL 2001. So what? Y2K is primarily about the rollover from 99 to 00.

2. YEAR 2000 PROBLEMS WERE INVENTED/OVERHYPED BY GREEDY CONSULTANTS.

Any crisis, real or imagined, attracts unscrupulous profiteers. To a point though, Y2K is fact.

3. MOST Y2K PROBLEMS WILL BE MINOR.

Thousands of minor problems happening simultaneously? That's the major problem.

4. Y2K WILL CAUSE THE END OF THE WORLD AS WE KNOW IT (TEOTWAWK!).

Prophets of doom love significant dates. Bored people make great disciples.

 NEW YEAR'S EVE IS A FRIDAY. I'LL HAVE THE WEEKEND TO FIX IT. Companies which started Y2K work years ago are still racing to finish. Avagoodweekend.

6. I TESTED/PATCHED THE BIOS AND IT'S FINE.

Great. Now what about your software, operating system and data — and those of your suppliers and customers?

PLANES WILL FALL FROM THE SKY, MEDICAL EQUIPMENT WILL FAIL BANKS WILL COLLAPSE.

Problems in those areas were the first to be fixed.

8. HAVE SOME CASH AT HAND, STORE EXTRA FOOD, ENSURE A WATER SUPPLY.

It's always a good idea to prepare for emergencies.

9. BUY A GUN TO PROTECT YOUR FAMILY FROM HORDES OF MARAUDING Y2K REFLIGES.

Survivalist rubbish. Spend the money on books and music.

10. MY WHITEGOODS WILL BE JUNK

How many microwaves, dishwashers and refrigerators need to know the century? Keep an eye on your VCR, but don't expect it to explode.

prepared. Our trading partners, however, are not."

Research firm Gartner Group has said much the same as the Red Cross, reporting in November that the year 2000 problem would be "analagous to a major storm".

"It will be, at worst, similar to a hurricane, cyclone or bad snowstorm," according to the Gartner report, Year 2000 Risk Assessment and Planning for Individuals. "For individuals, the year 2000 will not be a catastrophe such as a severe earthquake, a huge asteroid crashing into the Earth, or a nuclear war."

Such language does little to calm the nerves of those susceptible to panic. Plenty of doomsday prophets and extremist religions are capitalising on Y2K as an end point to the current world order, attracting new followers. There are even those who wish for hysteria (see 'Panic merchants', page 80).

Therefore one contingency plan overrides everything — the Australian government is working on a disaster plan involving crucial governmental departments, the emergency services and utilities.

"We're looking at a whole range of communications strategies to ensure that people have the best information about what they should be thinking about," said Senator Campbell. "We need to inform people about likely risks and also inform them about things that aren't going to be at risk."

For example, Australia's banking and finance sector is in pretty good shape. Work was started early and the government is keen to avoid mass withdrawals of cash by panicked citizens, but won't give too many specifics on its plans.

"We want people to make sensible decisions about what they do, so we're looking at a communications strategy to do that — we're discussing that at federal and state level. We're looking at systems and emergency preparations. I don't think we'll create a tome called an emergency plan, but there'll be a range of integrated strategies that are pulled together by the most responsible people," Campbell said. "We will involve ourselves in strategies that ensure that people behave rationally and sensibly based on good information.

"What we're looking at doing is making sure that people can do the sorts of things they did last New Year's Eve and that holiday week as they did this year," advised Campbell. "That's the plan, and I think it's fair to say that Australia's pretty well on track to achieve that in most of those key areas. And we're making daily assessments of those sorts of things. I think what we do have to plan for is the unforeseen things. We have to say, 'What is the impact if one of our major trading partners has significant failures — is there going to be a backwash effect to telecommunications, for example, or shipping, or aviation, or whatever?' I'm personally quite confident that our aviation systems and all of our major airlines will be in very, very good shape."

Though his tongue was slightly in his cheek, Campbell admitted panic among the populace was of genuine concern to the Howard Government: "We could reassure people about the provision of services from a utility, or from a bank, or from an airline or

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Above:

Y2K is a 1999

problem, said

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Program.

Graeme Inchley, CEO

of the government's

whatever, but people don't believe us because they never trust governments anyway . . . "

There are reports that Senator Richard Alston and Prime Minister John Howard will both take domestic flights this New Year's Eve, in an attempt to

maximise public faith in Qantas, Ansett Australia and the national air traffic control system. Campbell has not yet made up his mind. "I might be on the ground making sure the emergency plan's put in place."

If you're not the worrying type, at least take note that January 2000 will probably be a good time for dirt-cheap international air tickets.

It's almost here

The millennium countdown clocks in APC's office have lost 50 of their 365 days from the time the two Y2K features in this issue were conceived until they were written. Both articles overran their submission deadlines and the editor wasn't pleased.

That's not really good enough on our part, because Y2K is a deadline that cannot be messed with. Miss this one and there may be a higher price than the wrath of your boss. But even Y2K has its good side.

"This issue is bringing home to people, once they start looking at the processes they use, just how much their businesses use PCs," said Unisys consultant Alister Grigg. "How much local managers and people like that — line managers and project controllers — use just simple things like spreadsheets and so on to run their business. To do billing and time allocation, all that sort of stuff.

"The boardrooms of Australia were well behind the boardrooms of the United States in terms of technological understanding," the Federal Government's chief advisor on information technology, Paul Twomey, told the ABC in February. "I think Y2K is playing an important role in getting catch-up in that understanding."

If you've read the above and have just woken up to the problem, the best thing to do is be honest about it. Especially if you run a business that hasn't yet made any Y2K preparations.

"Get onto the Internet or ring an accountant or a member of the Institute of Engineers, find someone who's qualified to deal with Y2K and get some information about it," instructs Campbell. "Get the government's information bulletin if you want. And spend a couple of hours reading about the problem. Try to understand it's not just a PC problem, it's not just a computer problem, it affects systems, it affects airconditioning systems, it can affect lifts, it affects security systems, access systems, telecommunications systems. And understand that it's all-pervasive. Even if your own business is OK, someone who supplies you may not be, so that could affect your business, and your customers may be affected — if they're affected you may not have a business next year."

"I would say to any company that hasn't done something about it that it's never too late. It's better, quite frankly, if someone wakes up on the 15th December and says 'Oh hell, it's time'... It's obviously [even] better to start taking those steps in March or April than it is to start panicking in October or December. Because in those months it may well be that the resources you're looking for to change a piece of processing equipment or whatever may not be there."

Best get moving then, for the senator will accept no excuses. "With cyclones, with floods, with bushfires, with gas crises, with water crises, with electrical blackouts, massive lightning storms, things that are outside our control — you never know when they're going to hit. With this one you know it is going to hit on that day, so it gives you an opportunity to be very well prepared."

Expected year 2000 completion date

	AWARE OF THE YEAR 2000 PROBLEM	INTENDING TO UNDERTAKE YEAR 2000 WORK	BY JANUARY 1999	BY JULY 1999	BY DECEMBER 1999
INDUSTRY(a)	%	%	%	%	%
Agriculture	91	43	6	20	40
Mining	94	72	19	49	71
Manufacturing	93	62	11	32	60
Electricity, gas and water supply	98	86	10	65	84
Construction	91	50	7	30	48
Wholesale trade	98	75	24	52	73
Retail trade	89	51	11	31	48
Accommodation, cafes and restaurants	92	50	11	31	48
Transport and storage	95	48	12	34	48
Communication services	93	62	18	40	62
Finance and insurance	98	73	24	51	73
Property and business services	93	63	12	36	62
Education	95	60	13	36	57
Health and community services	96	70	15	43	69
Cultural and recreational services	93	54	12	31	53
Personal and other services	90	59	8	34	57

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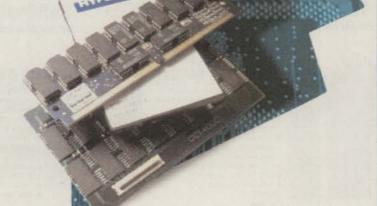
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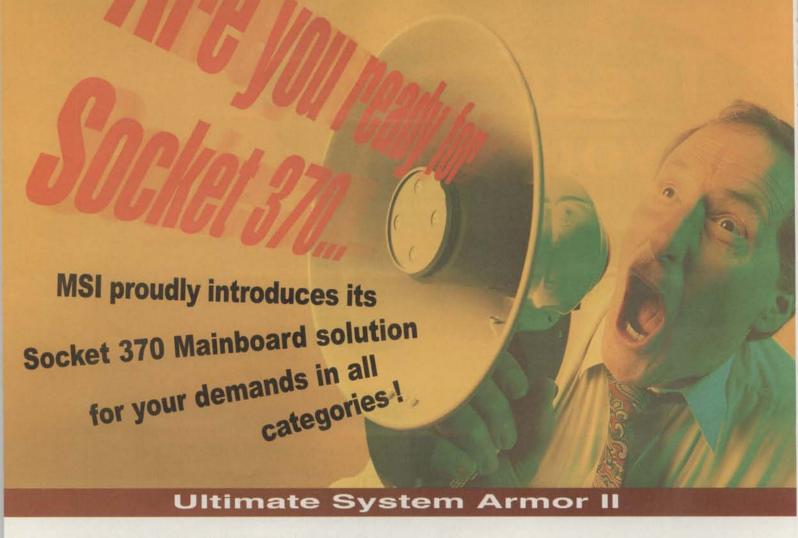


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Just how should you be dealing with Y2K?

By Simon Vandore

The Y2K repair process

company in Melbourne is marketing a millennium bug repellent spray, "a solution to the problem at hand with a simple swish of the wrist and spray of the secret formula".

It's a joke, of course. There is no magic bullet solution to Y2K, and in many cases the real solution is hours of dull, painstaking work. At this point in 1999 it is a bit late to be waking up to the problem, but the reality is that many businesses are still to discover the extent of their year 2000 difficulties. For others, 1999 was always going to be the year they would finally address PC and data problems.

However, professional repair methodology is now focusing more on business continuity than on actually taking inventories of hardware and software, applying patches, or performing intricate analyses of data. Strategies to ensure survival and insulation from external problems are now more important than work on the ground. There's no precedent for Y2K, so planning for all contingencies is the last line of defence.

It's never too late to start genuine repair, however, especially if your organisation is a small-to-medium enterprise (SME). The more you fix now, the less you will need to repair later; you will also decrease the risk of problems with day-to-day operations. The first step is to convince those who control budgets that there is a real problem. Then you have to show them how it will affect the way business is done. There are differing views in all organisations, so somebody has to present the evidence.

"When your managing director or your decision maker understands the issue and the impact on the business, it rapidly becomes priority number one. Nothing else matters," said Philip Dodd, year 2000 program marketing director for Unisys Australia and Asia. He has worked with Canadian Y2K guru Peter de Jager and has been involved with large-scale remediation projects in this country for about four years.



Dodd's advice for anyone starting now is simple. "I would suggest that they need to start right at the top. In other words, what is the organisation in business for, what is its reason for being, what does that organisation depend upon technologieswise, and therefore what are the important things to look at and qualify whether they're going to be impacted? Don't look at everything, you haven't got time.

"It doesn't start with looking at all the PCs in the building and seeing whether the BIOS will work, that's almost irrelevant. Plan for the fact that there will be some challenges, and manage your way through it, but sort out the critical things first . . . If I was starting a project two years ago, yeah, I would have done an inventory. Today, don't start it with the inventory - start it with the managing director and the board, or equivalent, saying 'What are we really here for? What's the critical stuff?"

Smaller organisations, on the other hand, may still benefit from the lessons people like Dodd have learned in bigger projects. An SME is likely to have a more centralised IT setup where repair is a less complex process, but is by no means simple.

The process

Eliminating the 'bug' involves upgrading, patching or replacing equipment and software that cannot distinguish between centuries. Examples range from PCs to such things as routers, network operating systems and embedded chips that run machinery or the systems that run a building. One non-compliant part can affect the whole, and stored data generated by this equipment perpetuates the risks.

Generally the reasons for action are different in every case. If, as is common, a piece of software measures elapsed time by subtracting a past date from the present one, errors can occur if the past date is in a 20th century year and the operation involves subtracting from a post-2000 date. For example, in two-digit years, 00 minus 99 equals -99, whereas in the four-digit year calculation 2000 minus 1999 equals 1. Apply this to billing, forecasting, expiry dates and scheduling, and things start to get pretty confused. Then there's myriad other possibilities, such as programs that use 9/9/99 to signify a termination point and those that are not compliant with the leap year in 2000 (normally a century is not a leap year, but 2000 will be). All these problems can cause miscalculations.

While there are many options on the

doesn't matter if non-Y2K compliant PCs are the clients, because all they do is display video and handle mouse and keyboard input. All other operations happen in a session on a compliant server.

Completing the mind-numbing task of altering years and years of data created with such faulty equipment and software is just as important. Each instance where the century is unspecified really needs to be changed, because this can create havoc for otherwise compliant hardware and software. On the other hand, it's almost impossible to be sure everything has been found,

"What happens is a lot of organisations extract information out of a whole load of disparate systems around the place, pull it together in a spreadsheet and run their organisation on the basis of that," said Wright. He agreed that the ultimate data risks are in organisations running spreadsheets hundreds of megabytes or even gigabytes in size.

Unfortunately, not everything can be replicated and tested in labs with redundant equipment. Sometimes it's necessary to go to individual PCs and interrupt work time, particularly on standalone machines.

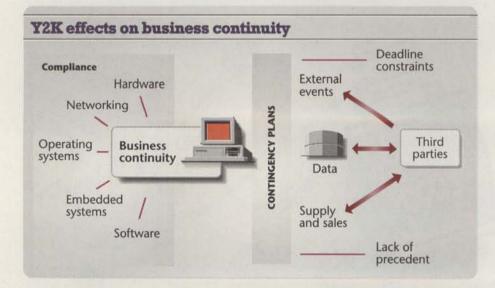
"The difficulty I think often is to justify to the users of the machines why you're doing it," said another Unisys Y2K consultant, Alister Grigg. "And ultimately with the data — the classic case — it often comes down to [the fact that] the people who actually use the PCs are the only people who can actually fix some of the data. Because they're the ones who understand how it's used . . . You can help them out with identifying the errors, but it's often not appropriate to fix it for them."

Distinguishing between what is salvageable and what is not is a matter of comparing budgets with resources and priorities. Greenwich Mean Time's software manuals dramatically describe a process of triage, the brutally sensible wartime practice of using limited medical resources only for those whose lives can probably be saved, at the expense of those suffering painful deaths and the walking wounded. GMT's theory is to apply this to Y2K-affected computer systems and start with mission-critical equipment that is repairable, then worry about replacing lost causes and addressing less crucial problems. Placing items into these categories is the hardest part.

"It very much depends on the customer's situation," said Grigg. "Considerations you might make are: the other activity that's taking place within that environment — if they have a requirement to roll out new technology anyway it may be more effective for them to just replace equipment or to replace applications. If their equipment or applications are very current, the issue may simply revolve around fixing the data and validating the data to the current standards."

One clear issue is that all 16-bit applications should be replaced, and Windows 3.x should be discarded. It's virtually impossible to make these compliant.

But in some cases it's also quite valid to perform no repair at all, if your contingency planning is solid enough to cope with whatever may arise. For example, if



market, the two PC-based Y2K repair tools that have gained the most respect with professionals are Greenwich Mean Time's (GMT's) Check 2000 and Viasoft's OnMark 2000, in various incarnations. (Symantec's Norton 2000 is actually OnMark 2000, and GMT has licensed its product to IMSI.) But there's no tool that does everything. These two are most useful for obtaining and understanding information about systems, and are available in versions that can be deployed across a network. Another worth mentioning is the Australian-developed MFX 2000 (from MFX Research), which uses some multipass proprietary algorithms to 'automatically' make software and data compliant, at the user's risk.

Hardware fixes range from BIOS upgrades to software programs that compensate for hardware inadequacies, and rather expensive ISA cards that override the non-compliant BIOS in old PCs which must be retained.

Citrix, the driving force behind the thin client industry, likes to push an alternative solution, basing all computing around a compliant server. In that case, it

so it's up to newer operating systems to try to catch the escapees. While Windows 98 itself is not fully Y2K compliant until you add patches from Microsoft (see http://www .microsoft.com/technet/year2k/) to fix various system files and the Java Virtual Machine (JVM), the operating system does allow the user to set a 100-year window for the interpretation of two-digit years. The default settings put them between 1930 and 2029, but you can set the parameters to anything you like; unfortunately this can also be used to sabotage Y2K compliance by setting the years to values like 1630 and 1729! But using the operating system as a safety net is a solution, of which Peter Wright, vicepresident of systems delivery practice with 2000 specialists DMR Consulting Group, is a big fan.

"The PC business is something where everyone can sit down and write [what] they think is a good solution. There are a lot of people putting out similar products. But I much prefer taking a strategic approach and saying 'let Microsoft provide the solution' because you don't know how many things are going to get tangled up in memory," Wright said.

automated processes can easily be switched to manual operation and you can switch to alternative suppliers should your current ones experience trouble, huge expenditure to fix relatively minor problems might not be justified. Tread carefully and explore all possibilities.

Contingency planning

Preparing for all that may happen involves examining both internal and external angles. While speed is of the essence in dealing with inhouse crises, the Y2K health of suppliers and customers also affects a business.

Larger Australian companies, such as major supermarket chains, have even spent money to ensure their suppliers are as ready as possible, to avoid a domino effect of shortages and reduced sales. They have mapped out alternative supply strategies in case their current sources are hamstrung.

Perhaps the biggest third-party risk for Australia comes from suppliers and customers in Asia, where the currency crisis has all but destroyed Y2K repair efforts.

"Their focus of course has been on economic survival, not on fixing the problem — it's a year away," pointed out Wright.

There's also the fact that the 2000 changeover in Australia happens during the peak holiday season, when there are traditionally less people on the ground to deal with a crisis.

"Another thing an organisation should be doing now is working out what sort of transition management they will implement," said Dodd. "For example, how many of the senior executives and critical support staff within the organisation are

How do Y2K repair tools work?

So you've got a Y2K analysis program to check your system or network - but what exactly do these programs look for, how do they test your system and how do they go about fixing any problems that they may find? We looked at Symantec Norton 2000, GMT Check 2000 PC, Prove It 2000 and MFX Research's MFX 2000.

There are four main areas that need to be analysed and repaired if a problem is found — these are the system BIOS and real-time clock (RTC), the compatibility of your operating system and store-bought software, the compatibility of custom software and applications, and the compatibility of your data.

The most pressing issue is the BIOS and RTC — if there is a problem with these two then they will cause havoc for your other applications. The RTC stores the date and time and continues to tick over even when your PC is switched off. Unfortunately, the RTC only stores the last two digits of the year with the century date held in CMOS in what is called the century byte. The BIOS compiles the date from both the RTC and the century byte and passes that information along to your OS and applications.

However, when the RTC switches over to 01/01/00, the century byte does not get updated. If your BIOS is not Y2K-savvy, it will reset back to 1900. For users of DOS, Windows 3.x and Windows 95, it will translate this into 1980, the first year with which it is capable of working.

The Y2K programs check for the ability for your PC to switch over to 01/01/2000 correctly. Not only that, but due to the workings of the Gregorian calendar, 2000 is a leap year, whereas the year 1900 was not. Any Y2K program worth its salt should test for this.

Testing the BIOS and RTC is a simple matter of rebooting the PC and letting the Y2K program take over. It winds the clock forward to a few seconds before a rollover date and then monitors what your PC does. Norton 2000 also checks the BIOS and RTC's ability to manage dates accurately during 2000. GMT's Check 2000 PC goes one step further and will test your system for compliance with the 'end of time' bug (9/9/99) used frequently by some programs.

Fortunately, if a problem is found with your BIOS and RTC the solution is simple. GMT, Norton and MFX come with BIOS fixes that run during startup and take care of the problem, and Prove-It has a TSR solution. If these don't work on your



machine, then using a flash upgrade to your BIOS may be in order, but it is extremely important that you use the correct one.

The next step is to take a look at your operating system and off-the-shelf applications. Most recent applications should work fine into the next century, but how can you tell which ones? Both the Norton and GMT packages can crossreference all installed programs against their own databases. Norton's is compiled from manufacturer recommendations, and GMT's is a mix of recommendations and its own Y2K tests. Unfortunately, no

package here can offer a guaranteed fix for any non-compliant software, but it will tell you what needs upgrading.

Harder to check and regulate is custom software and applications. GMT and Norton will scan for date problems within databases, spreadsheets and ASCII files which may be the only way you can test a custom program for compliance (provided it uses these file types). Otherwise it is best to contact the programmer or vendor that sold you the software.

Even though a software package may work into the next century, it does not necessarily mean that you won't encounter problems. Many packages use a 'pivot date' to decide whether a two-digit year is from this century or the next. An example of this is Excel 97. Any two-digit date from 00 to 29 is considered to be from 2000 to 2029 and any other date is from the 1900s. This will only be a problem if you have not been entering in four-digit years in your spreadsheets and applications. Norton 2000 will make copies of your spreadsheets and colour code the cells depending on the level of severity.

This leads us to the final problem with Y2K compliance, and the most timeconsuming to fix. It doesn't matter how compliant your software is or how well your PC works; if your data is invalid then you may as well give up. Norton, GMT and MFX will scan through spreadsheets and databases and check for date dependency problems. Changing these entries is extremely time consuming, but will prove to be worth it in the end.

No matter what course of action you take, though, it is important to remember that no single package contains a magic wand that will make all of your Y2K problems disappear.

Darren Ellis

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going to be working over Christmas and New Year? What are the economic impacts on the Australian economy — the tourism and travel industries, for example?"

It's also very important to make the extent of your contingency plans public if you're confident in them, show it. Several airlines around the world, such as British Airways and China's state airlines will require their top executives to be in the air on New Year's Eve. It's quite a good public relations scheme to buck the trend that says it's a bad idea to fly that night.

"That's a very valid attempt at saying to the people with whom they deal and the people who fly on their planes, 'We've got it under control'," said Dodd. "It's not to say that they will not be affected in some way because no-one knows for sure how the effects will manifest themselves . . . They are confident that they are putting in place appropriate management action and contingency planning to minimise the impact. And should there be any consequence likely, they will manage it. It's like any other difficulty, like okay, I don't have any fuel this week, what are we going to do about it? Or the sandwiches for economy class and the steaks for first class didn't arrive. What are we going to do? Well, we'll go and visit McDonald's and get a load on, or something to that effect."

Public relations

Honesty about preparations is very much in vogue. Some people question the value of claiming that anything is compliant when it can be affected by outside factors,

but the Australian Stock Exchange (ASX) has required absolute openness from its members on their Y2K readiness and encouraged the government to pass 'Good Samaritan' legislation (before Parliament at the time of writing) to protect them from the legal consequences of innocent errors.

"They need to be as open and honest as possible," said Graeme Inchley, CEO of the Commonwealth Government's year2k Industry Program. "The legislation that will be brought down in Australia will protect them in the event that the information they give someone causes problems with that other person, as long as it wasn't a statement made deliberately, misleadingly or mischievously or whatever. For everyone's sake, be open, be honest, share information with your customers and suppliers, expect them to do the same with you, and in fact learn from each other. And that will help us overcome the problems."

To help its members come up with statements of their own Y2K readiness, the ASX issued a definition of compliance: "The system or service has undergone an internal review process. In addition, as a minimum, each critical application has been or will be tested using an appropriate set of representative dates. On the basis of this review and any associated test results, the ASX assesses that the risk of material failure of the system or service as a result of date processing problems is not significant."

"Now that's not saying it will be compliant," said Inchley. "That's saying they've done a risk assessment and they believe that the risk is not significant, and you can't really do much more than that."

Meanwhile, Standards Australia came up with a document known as MP77, based on the British Standard Institution's widely accepted definition of Y2K compliance. It states that "Year 2000 conformity shall mean that neither performance nor functionality is affected by dates prior to and after the year 2000. In particular:

- Rule 1 No value for current date will cause any interruption in operation.
- Rule 2 Date-based functionality must behave consistently for dates prior to. during and after the year 2000.
- Rule 3 In all interfaces and data storage, the century in any date must be specified either explicitly or by unambiguous algorithms or inferencing
- Rule 4 Year 2000 must be recognised as a leap year in terms of handling both the 29th of February and day 366."

Finally, Philip Dodd helped Peter de Jager came up with some 50 'laws' of Y2K repair, partly for entertainment value and partly to help you reach the above definitions. They include the following (find them all at http://www.year2000 .com/archive):

- The more you look, the more you find.
- The more you find, the more it costs.
- You will divert spending from other critical projects to this even more critical pro-
- You can't know what you don't know. "So don't act as if you do," warned Dodd. "A lot of people try to save face by saying 'It's totally under control, we've got that fixed'. But I've never seen anyone like that."■

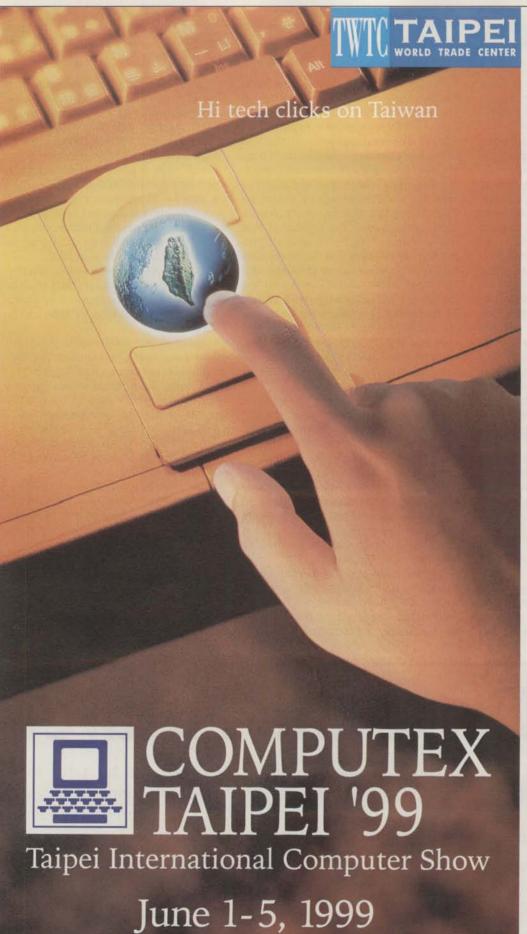
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A look at the technology that drives the Pentium III, and what it delivers. By Nathan Taylor

Pentium III inside



t this stage, the Pentium III (formerly known as Katmai) is not for everyone. For existing applications it will run no

faster than a Pentium II of the same clock speed. It does not even have the larger level 1 cache that sweetened the MMX deal and made us forget for a while that very few developers actually supported the new instructions.

The real winners with the new processor are game players. The Pentium III (and its 70 new instructions) has the potential to do a lot for 3D graphics. Better graphics, artificial intelligence and physics engines make 3D games much more exciting. It is also useful for other floating-point intensive applications like speech recognition and motion compensation in video. It all hinges on developer support though; like MMX, the new features of the processor can only be accessed with new instructions.

SSE

You may see it referred to in Intel releases and advertisements as Internet Streaming SIMD Extensions (Internet SSE), although 'Internet' is used more for marketing purposes. 'Streaming' is an allusion to the cache control instructions that some developers will find beneficial. 'SIMD', which stands for 'Single Instruction Multiple Data', refers to the gamut of new instructions enabling packed operations of floating point values.

Cache controller

One of the features of the new processor that is often overlooked is the large number of new instructions designed to give developers better control over the cache memory of the processor.

Perhaps designed as a stepping stone to Merced, in which pre-fetch and cache management will become an essential element in effective programming, the new instructions allow developers to load and unload information from the level 2 cache, and prevent delays associated with cache misses.

An example is video streaming, in which the cache is unnecessary, given Pentium

that each frame only appears once, yet the processor still checks the level 2 cache for the data. It makes sense to tell the processor not to waste its time checking the cache, and read exclusively from memory.

Driver developers might also find the feature useful, as it allows greater control over the driver components that go into the cache - frequently called or performancecritical driver components can be loaded into the cache with certainty. Similarly, developers of small transaction-based engines could find the features a boon.

Single Instruction Multiple Data

The Single Instruction Multiple Data (SIMD) feature has certainly generated the most publicity for this product. We have covered SIMD in depth before (see APC October 1998, page 95), but briefly, it enables multiple (four, in the case of the Pentium III) calculations to be performed by a single instruction.

For instance, to do four multiples, the processor would normally have to perform operations like: multiply A and B, multiply C and D, multiply E and F then multiply G and H - four instructions executed sequentially. With SIMD, the processor can simply issue a single instruction to do a packed multiple of A, C, E and G by B, D, F and H for a peak execution rate of four calculations per cycle, as opposed to one per cycle. It works best when the same set of instructions are to be performed repetitively on a large set of values.

MMX instructions are an example of SIMD, and these have been in the Pentium family of processors for some time. However, MMX can only handle integer values. SSE was designed with floating point (FP) values in mind, which makes it more useful for FP-intensive operations such as geometry setup in 3D graphics and voice recognition.

Intel has introduced eight new 128-bit registers and a new unit to execute SIMD FP operations. Each register can hold four single precision (32-bit) FP values for packed operations. Contrary to expectations, it cannot handle double precision values, leaving those operations to the FP unit. Integer operations are still left to MMX, which aliases its reqisters with the FP unit.

Overall, there aren't many more SIMD instructions than those supplied by the 3DNow instruction set that comes with AMD's K6-2 and later processors. They do pretty much the same things (despite Intel's efforts to teach us otherwise), enabling a peak of four FP calculations to be executed at the same time. 3DNow, however, has a number of gotchas about which operations can be executed in parallel, causing a few developer headaches.

The Pentium III also has the advantages of new registers (in the K6-2, 3DNow registers are still aliased with the FP unit, requiring clock-expensive mode changes) and the P6 core's traditionally better floating point engine, which will likely give it a serious performance boost overall when performing packed FP operations.

The processor also includes some new MMX instructions for integer values. Called 'new media instructions', these are mostly tweaks to the existing MMX instruction set to make it better match the algorithms used by developers. For instance, Photoshop currently uses MMX in a limited array of filters such as fades and blurs. According to Intel, the extensions to MMX will enable optimisation of a far greater range of functions with MMX.

TECHNICAL FEATURE/APRIL 1999 K.A.T.M.A.I.

The processor serial number

When Intel revealed that it was providing each processor with a unique serial number (the PSN, or Processor Serial Number), privacy groups were up in arms. They feared that a PSN could be used by unscrupulous individuals to track a computer user's behaviour. While such fears are actually founded more in paranoia than reality, Intel reacted to their concerns and provided the means to suppress the serial number.

To implement the PSN, Intel has extended the CPU_ID register, a special write-once register in the processor that is normally used simply to identify the processor model. The register has been expanded from 32 bits up to 96 bits, so the PSN is 64 bits long. The CPU_ID register can be easily read using a standard memory access command.

Is it insecure? In a sense. Any native code application can read the register without any trouble — but browsers have security features that prevent native code applications from being run over the Web without certification. Java applications, running in a Java Virtual Machine (JVM), cannot access the register, although ActiveX controls can, if you allow them to be run on your system (your browser should prompt you).

In reality, the security risk is no greater than letting any executable from an untrusted vendor run on your system — there is much more to worry about from a Trojan horse like Back Orifice than anything that reads your PSN. Indeed, there's very little that a company or group can do with the PSN once they have it — it does not grant them magical control over your system, nor does it allow them to track your movements on the Web or otherwise (despite rumours to the contrary). It simply tells them the PSN of the system you are using, which is rarely a secret anyway.

The PSN has some real benefits for both inventory management and authentication purposes. It can add an additional layer of security to Internet and intranet applications, for instance, requiring that access to certain sites be granted only from specific devices. Certain finance sites in the US, for instance, require that someone logging on know their username and password, as well as

actually using the physical machine.

Intel has already developed a tamperproof utility that Web sites can use to extract the PSN of client systems. Because it uses a little bit of native code, browsers running it should prompt the user before actually executing that code. Apart from the native code, the rest of the applet is written in Java, so should run on any operating system with a JVM.

It is technically possible to spoof the PSN with software, and undoubtedly some hackers will come up with a way to do so, perhaps through some sort of emulation scheme. For this reason the PSN should not be used as the final word in authentication, and passwords should still be required. The PSN is an additional layer of security for those who want it, not a replace-

ment for existing methods. Intel has also released a utility that suppresses the PSN and prevents anybody from reading it. Upon bootup, the PSN is switched on, but the utility runs during the load process of Windows (Windows is the only platform supported at this stage). Every power cycle sets the PSN back on, so the utility must be there constantly for the number to be suppressed. Once turned off, the PSN cannot be enabled without a reboot. Intel is also encouraging BIOS vendors to put a switch in the BIOS to turn off the PSN (obviating the need for the utility), and has publicly stated that it is recommending to all OEMs that Pentium III machines be shipped with the PSN suppressed.

Performance

Without applications available to test, it's difficult to tell how much the product's new features will affect performance. Intel has put together some canned demonstrations designed to show what the product can do, and the results are impressive, but real-world applications are another thing. The MMX demonstrations looked good too.

It has already scored some wins. Dragon Systems is claiming that training time on NaturallySpeaking has been reduced from 20 minutes to just five. Numerous game developers already have support for the product, and demonstrations of Quake III and Dark Reign II looked impressive.

In 3D games, geometry processing should become less burdensome. Because many computers will be rendering-limited (this is a function of the graphics card), it is likely that developers will focus on increasing the polygon count to create smoother models. Given that in most 3D engines, geometry processing is handled by proprietary routines, it will be mostly up to games developers to produce SSE-enhanced games. On the other hand, those that use OpenGL and DirectX retained mode APIs for geometry processing will see benefits only if the API has been optimised. In the case of the former, it is up to the graphics board vendor. Microsoft has already released DirectX 6.1, which has been optimised for SSE.

It's worth noting that few games developers actually use DirectX's retained mode, instead developing their own geometry engine and using DirectX immediate mode for hardware translation. So just because a game uses DirectX, it doesn't mean that it will make use of retained mode's SSE-enhanced geometry setup.

Display drivers can and have also been optimised for the instructions, although the benefits of doing so are limited. According to a 3Dfx representative, 3Dfx achieved an increase "as great as 20% and as little as 5%" by optimising their drivers and the rendering API Glide (which does not have a geometry engine).

When testing the Gateway system for this month's First Take section (see page 32), using DirectX 6.1, we also ran some tests with the non-optimised DirectX 6.0. The full results and breakdown can be seen in the review, and for the most part simply represent the performance boost offered by the increased clock speed. The interesting thing we found was the difference in the 3D WinBench 99 results.

3D WinBench 99 uses DirectX's retained mode, so it gives a good indication of the performance differential between optimised and non-optimised games. Tested with DirectX 6.0, the system only achieved a score of 508, some 221 points less than when tested with 6.1. This represents a performance increase of 43.5% when running with optimised routines.

Obviously this is not to be sniffed at, and game players could be well served by the enhancements. Business users, on the other hand, will find little that is compelling about the new instructions, except perhaps for the PSN. For this group of users, the increased clock speed of the processor will probably be the most important feature. In the end, of course, we'll all have processors with SSE, as Intel phases out its old core and introduces us all to the new one over the next few years.

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Budget scanner prices are falling. APC scans the options.

By Josh Mehlman

Get the picture?

hether you're putting pictures on a Web site, assignment or presentation, or just storing photos and documents on your computer, a scanner is becoming another essential purchase for the SOHO computer user. A year ago most budget scanners cost about \$300 to \$400. Thanks to increased demand and a new technology called CIS, prices keep dropping - scanners now start at just over \$100.

Too many numbers

When buying a scanner you're confronted with a lot of numbers and specs. The first figure vendors always mention is interpolated resolution. Vendors may claim a scanner has resolution of up to 9,600dpi, but this unrealistically high figure is actually achieved through software interpolation. This technique makes scanned images larger by adding spaces between the image's pixels and then filling them in with more pixels. This makes the files much larger but the image is no more detailed than a smaller, low-resolution scan. The maximum optical resolution is the highest level of detail a scanner is capable of, so this is the figure you should focus on. Optical resolution for budget scanners is usually somewhere between 300 and 1,200dpi.

But what difference does resolution make? For pictures that will be used on a Web page or printed on an inkjet printer, an optical resolution of 300dpi is nearly always adequate. Images on a monitor appear at a much lower resolution (around 72dpi) and most consumer-level inkjet printers can only print up to about 360dpi. However, if you want to print your images larger than the originals, you'll need a higher optical resolution scanner to prevent the image from looking blocky or fuzzy.

Another figure vendors throw around is colour depth. This refers to the number of colours a scanner can distinguish. In theory, a 30-bit colour scanner can distinguish over a billion colours, while a 36-bit scanner manages close to 70 billion colours. However, our eyes cannot distinguish anywhere near a billion



colours, so any improvement over 30-bit colour seems completely academic. Even so, our tests showed that the scanners with the best colour matching had 36-bit colour depth.

Which interface?

Now that USB has become popular, there are even more options to plug in your scanner. The general rule is that it's a trade-off between speed and price. SCSI is the fastest but most expensive, USB is cheaper but not as fast, while the parallel port is the slowest and the least expensive. We found that on a fast PC, such as the one we used for testing, parallel can sometimes be faster than USB. Most PCs can communicate through the parallel port in EPP (enhanced parallel port) mode, so if you're planning to use a parallel port scanner, we recommend changing your system BIOS to use EPP mode, as this can double the speed of the scanner.

CCD or CIS?

In the past year a new scanner technology known as contact image sensor (CIS) has appeared. Flatbed scanners have traditionally used a light-sensitive semiconductor called a charge-coupled device (CCD), which is the same sensor used in many video cameras. The light from the cold cathode lamp reflects off the image, and is focused using a series of mirrors and lenses onto the CCD element. This has kept scanners fairly expensive, because the complex optical systems required are relatively expensive to produce.

CIS is much simpler. The light source is a series of red, green and blue LEDs (light-emitting diodes), and this light reflects off the scanned image into a row of sensor elements which are directly next to the light source and only a few millimetres below the image. This eliminates the need for complex optics, as the light source and sensors can be located next to each other in the scanner arm. As a result, CIS scanners can be manufactured more cheaply than CCD scanners. CIS scanners also consume less power and can be much smaller than CCD scanners. However, CIS is a new technology and still has a way to go before it can match CCD in image and colour quality.

For this review of budget scanners, we accepted any flatbed scanners that sold for under \$350. One significant vendor in this market, Acer, declined to submit a scanner from its range for us to review.

SnapScan 1212u

AGFA

When we reviewed the SnapScan 1212u as part of a USB roundup (see APC March, page 119), we were impressed with its speed and the high-quality images it produced. After comparing it to the other budget scanners in this review, we were even more impressed.

The SnapScan 1212u we reviewed could manage 1,200 by 600dpi resolution and 36-bit colour. It breezed through a 300dpi scan in 32 seconds, and a 600dpi scan in 60 seconds flat, including the time taken to recalibrate before each scan. Also, its picture quality was the best of the bunch. The pictures were sharp and detailed, and colour matching was good across the spectrum.



The SnapScan comes with two TWAIN drivers: FotoSnap, for less-experienced users, offers little in the way of control, but allows you to scan quickly and easily; and FotoLook, for more professional scanners, allows high-level control over the scanning process. (A TWAIN driver acts as an interface between an application and scanner hardware, allowing images to be scanned directly into an application.)

Distributor	Agfa
Phone	(03) 9264 7711
Online	http://www.agfahome.com
■ Price	\$289 (USB) or \$299 in iMa
	colouring
In short	Excellent quality and speed
	at a good price.

Viewstation 1236P

ARTEC

The Artec 1236P we reviewed was a CIS scanner, capable of 1,200 by 600 resolution and 36-bit colour. This made it comparable in specifications to the Canon FB620P, but it is close to half the price.

However, the Canon scanner does have certain advantages to justify the extra bucks. The Viewstation 1236P's TWAIN driver was very primitive-looking, and our reviewers found it rather unfriendly. It is not



short on features, but finding and using them was not always easy. It would be more suited to experienced scanner users; others would probably have to rely on the settings the driver chose automatically, which were not always ideal.

Scanning speed was above average, but picture quality was well below average. Scanned images were not very sharp and tended to lose quite a bit of detail. The colours were flat overall, and dark areas caused problems.

Taking the price into account, the 1236P is probably a fair compromise, but we think image quality and ease of use are worth paying a little extra for.

Hallmark

Phone	(03) 9540 8555
Online	http://www.hallmark
	.com.au/
■ Price	\$155
In short	The picture quality isn't
	great, but the price is right i
	your budget is tight.

■ Distributor

Viewstation AM12E Plus

ARTEC

Artec's AM12E Plus appeared to be exactly the same box as the KTX 9600AP, but it had a different sticker on the top. The bundled software was almost exactly the same, and there's only one dollar difference in price. Its CCD scanning element was capable of 1,200 by 600dpi at 30-bit colour.

An interesting difference between the Artec and the KTX was that the Artec scanner came with a "most updated driver" floppy disk, which contains a more recent version of the TWAIN drivers than the one on the software CD-ROM. Although there were no significant performance increases over the KTX (which had older drivers), several of the image controls were greatly

It scanned a 300dpi image very quickly, but its speed at 600dpi was average. The picture quality was not entirely impressive - it lacked sharpness and the colours looked a little flat. The one unforgivable sin of the AM12E we reviewed was that the top edge



was not straight, so pictures tended to be skewed when lined up against it. At just under \$200, one can't expect miracles, but there is definitely room for improvement.

Distributor	Hallmark
Phone	(03) 9540 8555
Online	http://www.hallmark
	.com.au/
■ Price	\$198
■ In short	A budget high-resolution
	scanner, but picture quality
	could be better.

Viewstation AS6E

ARTEC

By far the cheapest scanner in this review, the AS6E retails at just \$110. For this price, you get a CIS scanner capable of 600 by 300dpi resolution and 30-bit colour, and a one-year warranty.

The AS6E comes with the same software as the Artec 1236P, and it looks rather primitive and not all that user-friendly though it is quite powerful. The software has one advantage: it intelligently selects the area to be scanned once it has performed a prescan, and usually gets it right. The scanner was also very fast, scanning a 300dpi photo in 21 seconds.

As you might expect for such an inexpensive scanner, there were compromises in image quality. Pictures were not sharp, probably owing to the poor alignment of the scanning elements that our test pattern clearly showed. Colour matching was poor and the colour and tone detail was also low.

Hallmark

■ Distributor



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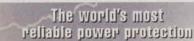
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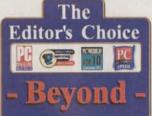












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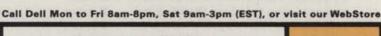
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.com.au/

Price \$110

In short Cheap, but with picture

quality to match.

CanoScan FB320P

CANON

Canon's FB320P CIS scanner is much smaller than the CCD scanners we reviewed; it has a sleek design, a small footprint and is very light. The FB320P is an affordable option for home users interested in adding pictures to their Web sites. It's capable of 300dpi resolution and 30bit colour. It was the slowest of the scanners we reviewed, taking 90 seconds to scan a photo at 300dpi.

It would be sufficient to scan photos for Web sites, but it's still not quite up to scratch if you want to print them. This is partially due to the 300dpi resolution lim-



itation; although you could print out photos the same size as the original with most home colour printers, any attempt to enlarge the photos would make them fuzzy or blocky.

The CanoScan's scanned images lacked the sharpness and detail of the more expensive scanners. It had trouble with dark areas and complex shading, tending to make those areas all the same colour. However, the colours looked warm and vibrant, and would stand out well on a Web site.

Distributor Canon

(02) 9805 2000 Phone

Online http://www.canon.com.au/ \$199 Price

In short Good for the Web, not for print.

CanoScan FB620P

CANON

Like its sibling the FB320P, Canon's FB620P took advantage of its CIS technology to fit into a small, lightweight, well-designed package. The FB620P had the image quality to challenge some of the CCD scanners

we reviewed, but its snail-paced scans at high resolution were unimpressive.

The FB620P achieved 600 by 600dpi resolution and 30-bit colour. It did so in reasonable style, as well. Scanned photos were much sharper and more detailed than those from the FB320P, and were comparable to some of the CCD scanners. The colours were more detailed than those in the FB320P's pictures, but were still lacking some precision in darker areas. As with the FB320P, the colours were rather warm, which is only a problem if you care about accurate colour matching; our reviewers actually liked Canon's colour balance.

The CanoCraft CS-P scanner driver was very user-friendly. As well as the full range of advanced image controls, there is a simple mode for less advanced users. Rather than fiddling with sliders and numbers, you have options such as 'lighten midtones', and it shows previews of how the picture will look with the midtones lightened.



■ Distributor Canon Phone (02) 9805 2000 Online http://www.canon.com.au/ Price \$299

In short Not a bad option if you're very patient.

Scanlet 4100C

HEWLETT-PACKARD

Hewlett-Packard's ScanJet 4100C CCD scanner will set you back just over \$300, but you will be rewarded with 36-bit colour. Its optical resolution was only 300 by 300dpi, comparable with the much cheaper Canon CanoScan FB320P. It connected through the USB port, although this





EDITOR'S CHOICE

Agfa SnapScan 1212u

HIGHLY COMMENDED

• Hewlett-Packard Scanlet 4100C

The Agfa SnapScan 1212u impressed us with its speed and great picture quality. It can scan up to 1,200dpi, has 36-bit colour and comes at a competitive price. We also appreciated the two TWAIN drivers for users with different experience levels.

Hewlett-Packard's ScanJet 4100C also wowed us with its TWAIN driver, which is perfect for inexperienced scanner users. It is unfortunate that it can only manage 300dpi optical resolution, because its picture quality is very good.

did not offer any significant advantages over the parallel port printers on our test system. It scanned a 300dpi photo in 27 seconds, which was fairly fast.

The Hewlett-Packard Precision Scan LT TWAIN driver was the most advanced and user-friendly of all the scanners in this review, but operated on the principle that it knew what was best, and the less you messed with things the better. It is clearly aimed at less experienced users, and will serve them well. It pre-scans images at 150dpi, which means if you want to scan images for Web sites or screen presentations, you just need to select the area you want and it's ready to use.

The picture was sharp and the colours fairly accurate, but tone and colour were a little flat. Overall, the scanned images were among the best in this review.

Distributor Hewlett-Packard Phone 1800 339 862 **Online** http://www.hp.com.au/ Price \$307 In short Good picture quality and very easy for first-time users.

9600AP

KTX

There was almost no difference between the KTX 9600AP and the Artec AM12E Plus other than the sticker on the lid. It has the same vaguely iMac-like colouring, the same specifications and the same soft-



ware, although the KTX had less recent drivers than the Artec. New drivers can be downloaded from the distributor's Web site. Nonetheless, the interface was fairly good, although the information it gave was a little on the lean side for less-experienced users, who may be a little intimidated by tone curves and other more professional tools.

Like the Artec, it was very fast at scanning 300dpi images and average at 600dpi. And like the Artec, the pictures were a little flat in colour and tone, and were not all that sharp.

■ Distributor Edge

Phone (02) 9353 9200

http://www.edge.net.au/ Online

Price

In short One of the better scanners

around for this price.

Astra 1220U

UMAX

This product has the specifications to match the best of them: USB support, 1,200 by 600dpi optical resolution, CCD scanning element and support for up to 36-bit colour. The scan quality was good, although not quite up there with the Agfa scanner, as the scans lost some colour definition. The colours were a little too saturated on both picture scans, although it maintained clean lines on the scan of the test pattern.

The bundled software was good, though unspectacular. The TWAIN driver was designed with inexperienced users in mind, but realistically, the 'advanced' view is easier to use than the beginners view.

The 1220 is available in three variations - for parallel port, SCSI and USB. We



looked at the latter and its speed was impressive - it was one of the fastest in the review. All round, the Astra 1220U is a good scanner, but one of the most expensive.

Distributor

Phone

Online Price In short (02) 9807 5222 http://www.cea.net.au/ \$349 (USB version)

Computer Enterprises

A fine scanner, although not the best we looked at.

Astra 610P

UMAX

The Astra 610P was one of the cheapest CCD scanners in this review, at only \$169 for the parallel port version (a SCSI version, the 610S, is available for \$279 including a SCSI card). It is capable of a maximum 600 by 300dpi resolution at 30bit colour depth. On our test system, the 610P achieved blistering speeds, powering through a 300dpi scan in 20 seconds, while a 600dpi scan took only 44 seconds. It should be kept in mind that this time was for a 600 by 300dpi scan, not 600 by



600dpi, as with most of the other scanners.

The bundled software, including the TWAIN driver VistaScan, were the same as the 1220U. VistaScan allowed a good range of controls over the picture, but its automatic suggestions were far from perfect. Overall picture quality was good, the picture was sharp and showed up fine details fairly well. The Astra handled dark areas and highlights well, but the colours lacked subtlety.

Distributor

Computer Enterprises Phone (02) 9807 5222

Online

http://www.cea.net.au/

Price

\$169

In short

Fast, great price, but picture

quality isn't the best.

How we tested

We tested each scanner by connecting it to a Dell Dimension XPS-R system with a 450MHz Pentium II processor, running Windows 98. The parallel port of the PC was set to EPP mode. We then performed the following tests:

 Scanning two photos at 300dpi and averaging the time;

 Scanning the same two photos at 600dpi and averaging the time;

 Scanning a test pattern at the maximum optical resolution;

 Scanning two documents and converting the image into text using OCR software when the software was provided.

The first photo was a desert cliff landscape that had a great deal of subtle variation in colour, many fine details, and some very bright and dark areas. We were particularly interested to see how well the scanners could bring out the detail in the shadowed areas. The second photo was a portrait, which we used to see how the scanner handled flesh tones and tricky areas, such as the subject's hair and clothing. We also compared the scanned images with the

original photos and with photos scanned

on a professional-level scanner (in this case a Sharp JX-330P) to see how well it

matched the colours. We checked each scanner driver's automatic suggestions of brightness, contrast, colour balance and tone against our reviewers' selections.

The test pattern consisted of some fine black vertical

and horizontal lines. This test showed how well the scanner dealt with finely spaced lines, which was a good indicator of how the scanner would handle fine details. In addition, fine lines indicated how well the optical elements in the scanner were aligned. The alignment of these elements

> contributes to the overall sharpness of the images.

Finally, in the OCR test, we scanned a printed page that had text of several different fonts and sizes. We scanned it again after sending it through a fax

machine, which reduced the resolution, added noise (small marks) and skewed the text slightly, all of which would make it harder for an OCR program to recognise the text.

Budget scanners: Specifications

	Agfa SnapScan 1212u	Artec Viewstation 1236P	Artec Viewstation AM12E Plus	Artec Viewstation AS6E	Canon CanoScan FB320P
Distributor	Agfa	Hallmark	Hallmark	Hallmark	Canon
Phone	(03) 9264 7711	(03) 9540 8555	(03) 9540 8555	(03) 9540 8555	(02) 9805 2000
Online	http://www.agfahome.com/	http://www.hallmark.com.au/	http://www.hallmark.com.au/	http://www.hallmark.com.au/	http://www.canon.com.au/
Parallel port version	SnapScan 1212p	1236P	AM12E Plus	AS6E	FB320P
Price	\$269	\$155	\$198	\$110	\$199
USB version	SnapScan 1212u	N/A	N/A	N/A	N/A
Price	\$289	N/A	N/A	N/A	N/A
SCSI version	N/A	N/A	N/A	N/A	N/A
Price	N/A	N/A	N/A	N/A	N/A
Maximum optical resolution (dpl)	1,200 by 600	1,200 by 600	1,200 by 600	600 by 300	300 by 300
Maximum colour depth	36-bit	36-bit	30-bit	30-bit	30-bit
Scanning element	CCD	CIS	CCD	CIS	CIS
Light source	Cold cathode	LED	Cold cathode	LED	LED
Scanning area (mm)	216 by 297	216 by 297	210 by 297	210 by 297	216 by 297
Bundled software (excluding TWAIN driver)	Ulead Photo Express, Caere OmniPage LE, PaperPort	IXLA Photo Scanner Suite, Xerox TextBridge	IXLA Photo Scanner Suite, Xerox TextBridge	IXLA Photo Scanner Suite, Xerox TextBridge	Photo Express, Caere OmniPage LE
Warranty	1 year	1 year	1 year	1 year	1 year, upgradable
Interface tested	USB	Parallel	Parallel	Parallel	Parallel
Time of 300dpi scan (min:sec)	0:32	0:27	0:21	0:21	1:26
Time of 600dpi scan (min:sec)	1:00	1:01	1:20	0:37*	1:34*

	Canon CanoScan FB620P	Hewlett-Packard ScanJet 4100C	KTX 9600AP	Umax Astra 1220U	Umax Astra 610P
Distributor	Canon	Hewlett-Packard	Edge	Computer Enterprises	Computer Enterprises
Phone	(02) 9805 2000	1800 339 862	(02) 9353 9200	(02) 9807 5222	(02) 9807 5222
Online	http://www.canon.com.au/	http://www.hp.com/	http://www.edge.net.au/	http://www.cea.net.au/	http://www.cea.net.au/
Parallel port version	FB620P	N/A	9600AP	1220P	610P
Price	\$299	N/A	\$199	\$279	\$169
USB version	N/A	ScanJet 4100C	N/A	1220U	N/A
Price	N/A	\$307	N/A	\$349	N/A
SCSI version	N/A	N/A	N/A	1220S	610S
Price	N/A	N/A	N/A	\$499 including SCSI card	\$279 including SCSI card
Maximum optical resolution (dpl)	600 by 600	300 by 300	1,200 by 600	1,200 by 600	600 by 300
Maximum colour depth	30-bit	36-bit	30-bit	36-bit	30-bit
Scanning element	CIS	CCD	CCD	CCD	CCD
Light source	LED	Cold cathode	Cold cathode	Cold cathode	Cold cathode
Scanning area (mm)	216 by 297	216 by 297	210 by 297	216 by 297	216 by 297
Bundled software	Photo Express, Caere OmniPage LE	Hewlett-Packard Precision Scan LT, Adobe PhotoDeluxe	TextBridge Classic, IXLA Photo Scanner Suite	Adobe PhotoDeluxe, Presto PageManager and PhotoAlbum, Caere OmniPage LE	Adobe PhotoDeluxe, PageManager, PhotoAlburn Caere OmniPage LE
Warranty	1 year, upgradable	1 year	1 year	1 year	1 year
nterface tested	Parallel	USB	Parallel	USB	Parallel
Time of 300dpl scan (min;sec)	1:15	0:27	0:14	0:35	0:20
Time of 600dpi scan (min:sec)	4:56	1:38*	1:51	1:20	0:44*

^{*}Scanner was operating above its maximum optical resolution.

1. All products used in these tests are shipping versions available to the public at the time of publication unless otherwise stated.

2. APC takes no responsibility for inaccurate specification information provided by vendors/distributors.

You may not need a big monitor, but we both know you want one. By Darren Ellis

On the big screen

ren't huge screens great? Whether it is a monitor or a television, bigger is better. For the purpose of these reviews we looked at the biggest CRT (cathode ray tube) screens we could find - 19in and 21in behemoths. We then placed these monitors through a gruelling, eye-straining test to see just how well they stacked up against one another.

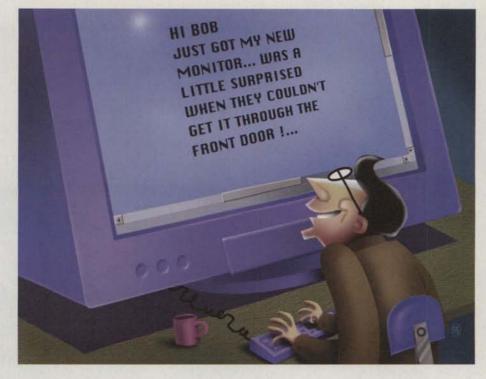
It's strange, though, that in a world where the prices of PCs and their components are constantly dropping, the prices of monitors have remained somewhat static. This is simply because manufacturing costs are holding relatively steady. What you paid for a 21in monitor a year ago is almost the same as what you would pay now. The good news is that there are now more big screens on the market.

What should you be looking for if you want to purchase one of these beauties? It depends on your needs - will you use it generally or for high-end/professional work? Usually a monitor that supports a high maximum resolution and refresh rate is ideal for the graphics/professional user, but it will cost more. Most of the monitors we looked at supported up to 1,600 by 1,200 at 75Hz, which is adequate for most graphics work, but far more than is needed for general use.

There are two main types of CRT monitors - those that use aperture grille technology and those that use shadow mask technology. Each type has its pros and cons. Invar shadow mask CRTs are cheaper, while aperture grille monitors are more expensive, but have a clearer picture.

Monitors that use the Invar shadow mask beam their picture through a metal perforated plate. The plate is heat resistant and it lets the picture filter through in very fine detail. The screen image comprises coloured dots similar to a television.

An aperture grille monitor displays its picture differently; the image is composed



of vertical lines of light. The aperture grille consists of tightly strung vertical wires that focus the electrons in lines of correctly coloured phosphors. Usually the image on an aperture grille monitor is more uniform than a shadow mask monitor. Many people think that monitors that use this technology (developed by Sony and used in Trinitron monitors) have a cleaner, better defined picture, but it also has its detractors. At times two lines are visible at approximately one-third and two-thirds of the way up the screen. These are the horizontal cables that hold the vertical cables taut.

During the course of our testing, something curious happened. When we switched on the NEC MultiSync P1250+, it became immediately evident that the top of the screen angled down slightly in the corners. This is an unusual problem. Normally, it is the sides of the display

that become distorted and need to be twiddled during calibration. We could find nothing in the OSD that could solve this problem and consulted the manual.

"If possible, position the front of the monitor facing east." We did just that, and to our surprise, the picture flickered and the top edge straightened. We realise that the Earth's magnetic fields can have all sorts of effects on electronic equipment, but we have never, ever come across a monitor so fickle.

We tried to get our hands on as many large LCDs and plasma monitors as possible, but it wasn't easy. Plasma screens are as rare as hen's teeth (see 'Plasma and LCD monitors', page 113), and according to one source, there is a worldwide shortage of LCD parts at present. Regardless, there are not that many LCD monitors with a display area comparable to that of a 17in CRT monitor.



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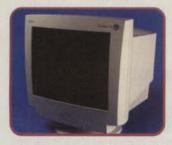
OMINIL OGIC

• 19in MONITORS

99c

ACER

The Acer 99c did not knock our socks off as much as the 21in Acer we reviewed (see page 110). It is one of the cheapest 19in monitors we tested, but this cheaper price comes with a compromise in quality. The image was not as sharp as it could have been, but was still



better than the Hitachi and Magtron. The level of brightness also left a lot to be desired, coming equal last in our results with the Magtron.

Overall, we found the monitor easy to use, with good colour definition (minimal colour misregistration) and text clarity. It was not the worst monitor we looked at. All up, the Acer 99c is Sony's equal in some respects, and has an extremely attractive price tag.

■ Distributor Servex

■ Phone (02) 8762 3500 ■ Online http://www.serv

http://www.servex .com.au/

Price \$1,199
In short Well price

In short Well priced but lacking quality.

VL950T

CTX

The CTX monitor was quite a pleasant surprise. Not only was it the cheapest 19in monitor we reviewed, it also performed admirably. It had better text definition and clarity than the Sony, but couldn't quite match its brightness and image quality over a distance.

The onscreen display (OSD, for adjusting the image) was



refreshingly easy to use. You can set a timer for the OSD; this is more useful than most monitors, which have a 10 to 20-second delay before the OSD disappears.

This plug-and-play monitor is one of the best 19in displays that we saw in this roundup, second only to the Mitsubishi Diamond View 1995. The CTX is very competitively priced, performs competently and is easy to use.

Distributor Ocean Office

Automation

■ Phone 132 286

Online http://www.ctxintl

.com/

■ Price \$1,050

In short Great price for a great

monitor.

CM753

HITACHI

Although this is not a bad monitor, neither the 19in nor the 21in Hitachi monitor cuts the mustard in comparison with the others in the review.

The CM753 was lacking in terms of image and colour sharpness. It was also one of the few monitors that displayed quite noticeable colour misregistration. Even with the brightness control on full it was still too dark—the whites were distinctly greyish in colour.

The OSD and menu were easy to use, however, and were quite effective in controlling any screen distortion or problems.

This was also one of the most expensive 19in monitors in our review, coming second only to the Sony Trinitron but falling well below it in terms of performance.

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SONY.

103 HARDWARE FEATURE/APRIL 1999



EDITOR'S CHOICE

Mitsubishi Diamond View 1995

HIGHLY COMMENDED

CTX VL950T

Although we used the Sony Trinitron as a baseline for comparison (due to its great picture and quality), we have not given it an award because of its high price. We were quite taken with the Diamond View 1995 monitor. It scored well and has a very crisp display, although it wasn't the easiest to use.

Another impressive monitor was the CTX VL950T. Although the brightness and screen quality over a distance were not as good as some of the other monitors here, it performed very well in our tests. It was also the cheapest monitor in our roundup.



Distributor Phone

Hitachi (02) 9888 4100 Online http://www.hitachi.com.au/

Price \$2,099

Too expensive for the quality.

XI-810

In short

MAGTRON

For a monitor aimed at the high-end/professional market, Magtron has not done too badly with the XI-810. In terms of colour quality and crispness it equalled the Sony; there was very little colour misregistration and no distortion.

The overall image sharpness was not quite as good you might like, especially if you rely on your monitor for detailed graphics work and imaging. For high-contrast images, though (such as white text on a black background), the display was



crisp and clear. We found that we had to turn the brightness to its maximum setting to equal the Sony display.

Out of all of the 19in displays it had the most user-friendly OSD and menu, which made it the easiest monitor to set up and use. For a monitor aimed at the professional, Magtron has priced the XJ-810 quite attractively at \$1,373.

■ Distributor Phone

Online

Price

Magtron Monitors (02) 9975 3727 http://www.magtron

.com.au/ \$1,373

In short A good monitor, but not the best.

Diamond View 1995

MITSUBISHI

This monitor was the only 19in to equal and better the Sony in our tests, and it did so with the third-cheapest price out of the lot. Overall, we found the screen image had sharper definition and more clarity than any of the other monitors, including the 21in models. Paradoxically, though, the readability of text was not as good as it could have been.



The Diamond View scored well in terms of brightness and image quality over a distance. The colour quality was also quite good, with minimal misregistration in the tests. It shares the same OSD menu and controls as the Acer 99c, which we didn't find as good as those of the Sony or Magtron.

All up, we were extremely impressed with the Diamond View. The antiglare coating on the tube worked rather well, but couldn't quite match the Trinitron for reflection-free viewing.

■ Distributor

Phone Online Mitsubishi Electric (02) 9684 7777 http://www.mitsubishi-

electric.com.au/ \$1 349

Price In short

At the lower end of the price scale, but at the higher end of the performance chart.

Trinitron GDM 400PS

SONY

The fact that we used the Sony Trinitron as a baseline against which all other monitors were compared should tell you something about the quality of this monitor. Sony had the upper hand until late last year by exclusively using its Trinitron flat-screen technology, but in this review we've seen some other contenders sharing that technology and giving Sony a run for its money.



What can we say about the GDM 400PS? Everything about it is fabulous. We were expecting the Sony to come out on top of the pack, but surprisingly it was beaten by some of the other monitors in a few aspects, namely the sharpness of the image and text readability. Aside from these points, the Sony Trinitron GDM 400PS is a great monitor. Our only gripe is that it's far too expensive.

■ Distributor

Sonv 1800 226 429

Phone

http://www.sony.com.au/

Online Price

\$2,186 In short Pricey but fabulous.

Graphic G790

VIEWSONIC

The G790 is aimed at the graphics market. Although it comes close to the Sony, it does not quite deliver the colour quality you would expect from a high-end monitor.

Priced in the middle of the pack, the G790's image sharpness and quality can't be faulted, except that it lost some picture definition from a distance. There was slight colour misregistration and the brightness and contrast weren't as sharp



as they could have been, but in normal use the display was quite crisp and clean. One thing that was noticeable was its lack of glare; it was almost as glare free as the Sony.

- Distributor
- Phone
- Online
- Price
- In short

Chips and Bits (03) 9696 1911

http://www.viewsonic.com/

\$1,599

Averagely priced and competent.

How we tested

Testing a monitor is subjective, as the only way you can measure the brightness, contrast, colour and picture quality of a screen is with the human eve.

To achieve the most accurate results possible, we used Sonera Technologies' program, DisplayMate, to rate the monitors. To ensure the best results and to limit discrepancies, only one reviewer tested all of the displays.

To do this, we set up 'baseline' monitors, against which all others were compared. We selected the Sony Trinitron GDM 400PS and GDM 500PS due to their high quality. These monitors were calibrated to give the best picture possible, and then given a score of 8 for every result.

Our monitors were connected to a Gateway Pentium II 300 with 32M of RAM and an ATI 3D Rage Pro graphics card. The video signal was split on a cable capable of 1,024 by 768 at 85Hz on each connection. The testing software used a resolution of 800 by 600 at 85Hz, which is less than the optimal resolution of each monitor. (Using the monitors at their optimal resolution will yield better results.) Each monitor was calibrated to give the best results possible.

What we looked for

- Moiré patterns the wavy flickering sometimes seen on a screen.
- Colour misregistration slight distortion where contrasting colours

- meet (horizontal and vertical).
- Background interference anything visible on the screen that is not part of the projected image.
- Colour purity uniformity of colours across the screen.
- Pincushion distortion when the sides of the screen are warped.
- Focus general image quality over the display (particularly in the corners).
- Ghosting and streaking images present that shouldn't be (usually noticed with high-contrast images).
- Glare room glare appearing on the screen.

We rated the monitors out of 10 (the baseline monitors scored 8) for each of the following aspects.

- Image sharpness We tested using images of varying sizes for loss of definition or fuzziness.
- Text readability How well could the text be read in different sizes, different colours and on different backgrounds? Was the text sharp or fuzzy?
- Colour sharpness How well defined were the colours?
- Colour quality How true were the colours? Was there any loss of quality across the screen? Any misregistration?
- Brightness How bright was the display and especially the white?
- Quality at a distance How good was the display definition at a distance?
- Ease of use How simple was it to set up? Are the controls and OSD easy to use?

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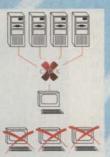
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021in MONITORS

211c

ACER

We preferred this monitor to the 19in Acer, and in many regards it scored better than the Sony. We were impressed with the crispness of the display, both for the readability of text and the overall image quality.

We found remarkable similarities between this monitor and the Mitsubishi Diamond View 2107. Not only do they feature the same OSD and control functions. but also when we scored the monitors, they both rated exactly the same. Because of the easy-to-use OSD and menu, we gave both a higher score than the Sony.



The only part of the test where this monitor was found to be lacking was its brightness and contrast controls. They had to be set quite high to achieve a good result, but not as high as some of the monitors which required 100% on both.

Distributor	Servex
Phone	(02) 8762 3500
M Online	http://www.servex.com.au/
Price	\$2,499
In short	A very good monitor.

SuperScan CM813

HITACHI

We weren't blown away by either of the Hitachi monitors submitted to us for testing, which is strange, because Hitachi used to be one of the prime providers of CRT tubes. Overall, the picture quality on the monitor we tested suffered due to a moiré pattern that we couldn't shake no matter what we tried.

It had good text clarity, and the OSD and menu were simple to use, but it was lacking in other areas. The colour quality and sharpness did not quite match the other screens, and the colour registration was worse in this display than any other.



The maximum resolution of this display (1,856 by 1,392) is larger than normal — ideal for the graphics professional. For a high-end monitor, it is reasonably priced, but still one of the more expensive displays we tested.

Distributor	Hitachi
Phone	(02) 9888 4100
Online	http://www.hitachi.com.au/
■ Price	\$3,699
■ In short	Good price for a high-end
	monitor

P202

IBM

This is the first of three 21in monitors we tested which featured a Trinitron tube. They all scored identically in our tests, but we gave the IBM a slightly higher score for ease of use, due to its comprehensive but simple OSD and menu.

We could not fault the P202 at all, apart from the two visible cable lines at one-third and two-thirds of the way up the screen. The picture quality however is great, the clarity and colours crisp and rich. It also features dual video inputs to allow two systems to share one screen.

Remarkably, the IBM P202 is priced similarly to the more expensive 19in displays but nearly \$1,000 cheaper then the next nearest-priced Trinitron display (Sony), which finally places a 21in Trinitron within the reach of mere mortals.



Distributor

IBM

Phone Online 132 426

Price

http://www.ibm.com.au/ \$2,474

\$2,474 for a 21 in Trinitron? Get it while stocks last.

DJ920

In short

MAGTRON

The DJ920 impressed us in all areas aside from one — the colour quality. The corners of the monitor we tested had slight distortion and discoloration. This was a problem we were unable to fix. Surprisingly, though, the monitor had the best colour registration of all of the monitors we tested.

The display was crisper and cleaner than the Sony, regardless of the corner distortion; it equalled the quality of the Acer 211c and Diamond View 2107 for sharpness. Text was easy to read, the colours were crisp and the quality was good over a reasonable distance.

All up we were impressed with this monitor. It's affordable, had very sharp images and was reasonably easy to use.



■ Distributor	Magtron Monitors
Phone	(02) 9975 3727
Online	http://www.magtron .com.au/
III Price	\$2,242
■ In short	A very good monitor at a good price.

Diamond View 2107

MITSUBISHI

As mentioned in the Acer 211c review, both these monitors share the same OSD, and scored exactly the same in our tests. Essentially, they are the same monitor, although we did prefer the control design of the Diamond View. Even better, this one costs over \$300 less than the Acer 211c.

In every respect apart from brightness, the Diamond View 2107 scored equal to or



better than the Sony. The picture was extremely crisp and clear, and there was only the slightest hint of colour misregistration. Text was extremely easy to read, and the quality over a distance was great.

Distributor

■ Phone
■ Online

■ Price

■ In short

Mitsubishi Electric (02) 9684 7777

http://www.mitsubishielectric.com.au/

\$2,195

Great price for a great

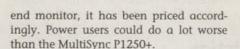
monitor.

MultiSync P1250+

NEC

The NEC MultiSync P1250+ performed well in all of our tests, and scored identically to the other two 21in Trinitron monitors (apart from IBM's 'ease of use' score). Once again, the two cable lines were visible on the screen, but these are mainly noticeable in a flat-coloured display, not so much when displaying pictures or multicoloured images.

The MultiSync P1250+ is aimed at power users, CAD/CAM operators, DTP and graphic designers; the maximum resolution is set higher than normal at 1,800 by 1,440 at 73Hz. The display was crisp and clean with no picture distortion — if you ignore the 'facing east' problem (see page 105). Unfortunately, being a high-



HIGHLY COMMENDED

Mitsubishi has done it again with the 21in Diamond View. Compared to the Sony Trinitron, the Diamond View scored

apart from brightness. We loved the

equal to, or better than it in every regard

controls (the same as those used by the

Coming close to being nominated for

Editor's Choice was the IBM P202. Out of

controls were slightly better than the Sony

stand apart though is the price - \$2,474.

screen, and gets our thumbs up for value.

and NEC screens, but other than that, it

scored exactly the same. What makes it

This is unusually cheap for a Trinitron

the three 21in Trinitron CRTs featured

here, we liked this one the best. The

Acer 211c) and were quite impressed

overall with the picture quality.

BM P202

■ Distributor

NEC

Phone

(02) 9930 2000

Online

http://www.nec.com.au/ \$3.900

Price

In short

Capable high-end Trinitron.

PanaSync S110

PANASONIC

The PanaSync S110 is another good monitor that falls just short of equalling the Sony Trinitron. The image clarity and sharpness was on a par, but the colour crispness and







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the general display from a distance were not as good. As with the Sony, there was only the slightest hint of colour misregistration.

Once again, we had to set the brightness and contrast rather high, and even then the whites were not glaring. The display was brighter than the ViewSonic and Hitachi 21in displays. It didn't have much reflection or glare.

■ Distributor Panasonic Phone 132 600

Price

Online http://www.panasonic

.com.au/ \$2,700

■ In short Slightly pricey in comparison

to the other screens.

Trinitron GDM 500PS

SONY

As we have mentioned, the Sony Trinitron was our baseline for comparison, chosen for its known high quality.

Choosing the best 21in Trinitron monitor was a difficult decision; the quality of all three in these reviews were on a par. The clarity, colours, brightness and overall picture were superb. The only thing we didn't like was the sometimes perceptible cable lines across the screen.

The flat screens cut down on reflection



and glare, and the Sony's controls were quite simple to master. The only drawback with the Sony Trinitron is that it is expensive.

Distributor Sony Australia
Phone 1800 226 429
Online http://www.sony.com.au/

■ Price \$3,272

■ In short Great quality but still

expensive.

Professional P817

VIEWSONIC

This is another high-end monitor for the CAD/CAM operator or graphics professional. The maximum resolution is a



whopping 2,048 by 1,536 at 85Hz, and the scanning frequencies are higher than any other monitor here.

At our low testing resolution (800 by 600), the display was not capable of delivering the greatest picture quality. The image and colours were not the sharpest, and the maximum brightness left a lot to be desired. The image focus seemed to be out slightly at the corners. However, when we increased the resolution, this problem corrected itself.

■ Distributor

Chips and Bits (03) 9696 1911

\$4,679

■ Phone ■ Online

http://www.viewsonic.com/

Price

In short

One of the best high-end screens on the market.

19in monitors: Vital statistics

	Acer 99c	CTX VL950T	Hitachi CM753	Magtron XJ-810	Mitsubishi Diamond View 1995	Sony Trinitron GDM 400PS	ViewSonic Graphic G790
Distributor	Servex	Ocean Office Automation	Hitachi	Magtron Monitors	Mitsubishi Electric	Sony	Chips and Bits
Phone	(02) 8762 3500	132 286	(02) 9888 4100	(02) 9975 3727	(02) 9684 7777	1800 226 429	(03) 9696 1911
Online	http://www.servex .com.au/	http://www.ctxintl .com/	http://www.hitachi .com.au/	http://www.magtron .com.au/	http://www.mitsubishi- electric.com.au/	http://www.sony .com.au/	http://www.viewsonic .com/
Display size	19in	19in	19in	19in	19in	19in	19in
Price	\$1,199	\$1,050	\$2,099	\$1,373	\$1,349	\$2,186	\$1,559
Warranty	3 years onsite	3 years limited	3 years	3 years RTB	3 years limited onsite	3 years onsite	3 years onsite
Specifications							
Maximum resolution	1,600 by 1,200 at 76Hz	1,600 by 1,200 at 75Hz	1,600 by 1,200 at 85Hz	1,600 by 1,200 at 75Hz	1,600 by 1,200 at 75Hz	1,600 by 1,200 at 75Hz	1,600 by 1,200 at 76Hz
Dot pitch	0.26mm	0.26mm	0.22mm (vertical) / 0.14mm (horizontal)	0.22mm	0.26mm	0.25 to 0.27mm (variable)	0.26mm
Scanning frequency horizontal/vertical (KHz)	30 to 95KHz/50 to 160KHz	30 to 95KHz/50 to 160KHz	31 to 107KHz/50 to 160KHz	30 to 95KHz/50 to 160KHz	30 to 95KHz/50 to 160KHz	30 to 94KHz/48 to 160KHz	30 to 95KHz/50 to 180KHz
Viewable area	18in	18in	18in	18in	18in	18in	18in
Dimensions (h by w by d)	472 by 466 by 493mm	460 by 461 by 476mm	434 by 505 by 460mm	460 by 463 by 465mm	472 by 466 by 493mm	449 by 441 by 502mm	452 by 450 by 465mm
Weight	22.9kg	22.5kg	24kg	26kg	23kg	25kg	22kg
Results							
Image sharpness	7.5	8	7	7	9	8	8
Colour sharpness	8	8	8	8	8	8	7.5
Color quality	8	8	7.5	8	8	8	7.5
Text readability	8	8.5	7.5	8	7.5	8	8
Brightness	6.5	7.5	7	6.5	8.5	8	7
Quality from a distance	8	7.5	7.5	7.5	8.5	8	7.5
Ease of use	7	8	8	8.5	7	8	8

21in monitors: Vital statistics

	Acer 211c	Hitachi SuperScan CM813	IBM P202	Magtron DJ920	Mitsubishi Diamond View 2107
Distributor	Servex	Hitachi	IBM	Magtron Monitors	Mitsubishi Electric
Phone	(02) 8762 3500	(02) 9888 4100	132 426	(02) 9975 3727	(02) 9684 7777
Online	http://www.servex.com.au/	http://www.hitachi.com.au/	http://www.ibm.com.au/	http://www.magtron.com.au/	http://www.mitsubishi-electric .com.au/
Display size	21in	21in	21in	21in	21in
Price	\$2,499	\$3,699	\$2,474	\$2,242	\$2,195
Warranty	3 years onsite	3 years	3 years RTB	3 years RTB	3 years limited onsite
Specifications					
Maximum resolution	1,600 by 1,200 at 85Hz	1,856 by 1,392 at 80Hz	1,600 by 1,200 at 85Hz	1,600 by 1,200 at 85Hz	1,600 by 1,200 at 85Hz
Dot pitch	0.26mm	0.22mm (vertical)/0.16mm (horizontal)	0.25 to 0.27mm (variable)	0.28mm	0.26mm
Scanning frequency horizontal/vertical	30 to 107KHz/50 to 160KHz	31 to 115KHz/50 to 160KHz	30 to 107KHz/50 to 160KHz	30 to 110KHz/50 to 160KHz	30 to 107KHz/50 to 160KHz
Viewable area	20in	20in	19.8in	20in	20in
Dimensions (h by w by d)	515 by 508 by 512mm	487 by 483 by 470mm	498 by 513 by 500mm	504 by 480 by 560mm	515 by 508 by 512mm
Weight	29.4kg	27.7kg	31kg	31.5kg	29.4kg
Results					
Image sharpness	8.5	7 -	8	8.5	8.5
Colour sharpness	8	7.5	8	8	8
Colour quality	8	7	8	6.5	8
Text readability	8.5	8	8	8.5	8.5
Brightness	7.5	6.5	8	8	7.5
Quality from a distance	8	7.5	8	8	8
Ease of use	9	8	8.5	8	9

	NEC MultiSync P1250+	Panasonic PanaSync S110	Sony Trinitron GDM 500PS	ViewSonic Professional P817
Distributor	NEC	Panasonic	Sony	Chips and Bits
Phone	(02) 9930 2000	132 600	1800 226 429	(03) 9696 1911
Online	http://www.nec.com.au/	http://www.panasonic.com.au/	http://www.sony.com.au/	http://www.viewsonic.com/
Display size	21in	21in	21in	21in
Price	\$3,900	\$2,700	\$3,272	\$4,679
Warranty	3 years	3 years	3 years onsite	3 years onsite
Specifications				
Maximum resolution	1,800 by 1,440 at 73Hz	1,600 by 1,200 at 75Hz	1,600 by 1,200 at 85Hz	2,048 by 1,536 at 85Hz
Dot pitch	0.28mm	0.25mm	0.25 to 0.27mm (variable)	0.26mm
Scanning frequency horizontal/vertical	30 to 110KHz/55 to 160KHz	30 to 94KHz/50 to 180KHz	30 to 107KHz/48 to 160KHz	30 to 137KHz/50 to 180KHz
Viewable area	19.6in	20in	19.8in	20in
Dimensions (h by w by d)	509 by 519 by 525mm	505 by 487 by 519mm	498 by 505 by 474mm	496 by 491 by 524mm
Weight	34.3kg	27.5kg	31kg	30kg
Results				
Image sharpness	8	8	8	7
Colour sharpness	8	7.5	8	7
Colour quality	8	8	8	7.5
Text readability	8	8	8	8
Brightness	8	7	8	6.5
Quality from a distance	8	7.5	8	8
Ease of use	8	8	8	8

Plasma and LCD monitors

We looked at three big LCDs, but due to space constraints the reviews will appear only on our Web site, apcmag.com.

We were hoping to be able to review some plasma screens too, but as well as being expensive, they are also scarce. A plasma screen usually has a display size of 42in and can display resolutions up to 800 by 600. This may not sound like much on

such a large screen, but it does look good.

Unfortunately, the manufacturing process for creating the screens has not been perfected yet, so only 10% to 20% of the screens manufactured are of usable quality. This bumps the sale price up to astronomical limits (over \$15,000), making them too expensive at the moment for most purposes. Sony, Fujitsu, Philips, NEC and

Panasonic currently manufacture these screens, but evaluation units are rarer than the sale units. Meanwhile, the R&D people are working on the manufacturing process and increasing the maximum resolution available. Until the prices come down and more screens become available, we can only wait and dream. **Darren Ellis**

The Essential Desktop for sts and







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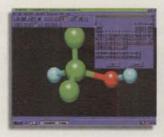
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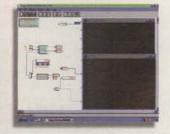
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Software

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GROUPWARE

A look at the top three commercial groupware solutions.

By APC staff

All together now

roupware is more than just messaging. If all you want is email, you should use Sendmail. Calendaring, scheduling, document management and workflow are the hallmarks of a well-utilised groupware package. Publishing for internal use and on the Internet have also become important components in recent product releases. Each groupware package deals with these issues to a greater or lesser degree.

Figures from research group IDC at the end of last year put Lotus Notes in the lead position in the groupware market with 29.57 million seats worldwide. Microsoft Exchange Server followed with 21.19 million seats and Novell GroupWise with 14.21 million seats. Notes also led in terms of growth. It had 13.44 million new users worldwide in 1998, while Exchange had 11.78 million new users. The market for GroupWise also increased, although more slowly, with 4.51 million new users in 1998.

For the purpose of this feature, we've looked at the current state of each of these products, or, in the case of Notes, what's coming up this year (the full version of Notes 5.0 may be available by the time you read this). Unfortunately, due to its early stage of development and reliance on Active Directory, we could not review Exchange Platinum, Microsoft's upcoming version of Exchange.

The big trend is a move towards open Internet standards and homogenous clients. In each of the three major packages, email can be accessed via standard mail clients using IMAP or POP. Mail directories are accessible via LDAP and transferred via SMTP. In fact, each of them actually goes a step further, providing HTML access to mail through forms. Other applications, including calendaring, are similarly accessible via HTML, although the development required to make this happen varies considerably depending on the platform. It's clear that the intranet is not dead.



All three companies have done a very good job of maintaining support for their existing clients and applications, even as the products have progressed through generations. The platform's preferred client still works the best; Web browsers can only do so much.

Novell and Microsoft have gone to great pains to ensure their respective groupware platforms tie in well with their operating systems by including integration with directory services, object and development models, and other core OS features. For these platforms, it is a double-edged sword — GroupWise and Exchange work well on their native platforms (for Exchange, the server only runs on the native platform), but their cross-platform abilities are limited. Notes lacks this OS integration, enabling it to be installed on a variety of platforms, but sacrifices other aspects as a result.

Notes, the first real groupware package, still has a lot to offer — and a long way to go. Microsoft and Novell are more recent comers to the market and have done a great job of copying the good features of the Lotus package, and have even introduced some innovations of their own in recent versions. In the end, you should choose the package that integrates best with your business practices and current systems. We haven't awarded an APC Editor's Choice award in this review because each package provides different features appropriate for different organisations. Some people may even want to patch together their own solutions, and we've got some tips for this beginning on page 124.

Although we decided to review the top three commercial packages, some of the lesser known solutions — such as Netscape SuiteSpot or Fujitsu's TeamWare Office — should not be overlooked if you're in the market for groupware.

Lotus Notes 5.0 Beta

Page 116

Microsoft Exchange 5.5

Page 118 Page 120

Novell GroupWise 5.5

Do-it-yourself groupware Page 124

Notes/Domino 5.0

LOTUS

Lotus Notes has always been a jack-of-alltrades. While other platforms separated messaging and applications, Notes' flatfile, database-driven infrastructure successfully integrated email, calendaring and business applications.

Although Notes has largely been deployed as a messaging product, its capabilities extend to business applications. particularly database-driven applications. For instance, an inbuilt word processor (which is nothing on the scale of a proper word processor) can deal with the creation of various types of documents directly within Notes databases. Developing applications under Notes has always been dead easy, because of its tight framework. Notes also pioneered the concept of replication synchronising databases of different devices. A proprietary client (the Notes client) used to be required to run these applications.

Version 4 of Notes (the server has been renamed Domino) introduced Web serving to the product. Applications developed in Notes could be dynamically converted into HTML pages and forms for display on Web sites and intranets. This would have made the proprietary client obsolete, except for the fact that it was still a much better client than a Web browser for most applications.

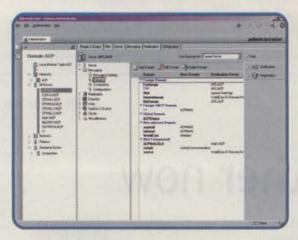
Version 5.0, which may be available by the time you read this (we looked at a late beta), promises to take the support of open standards to a new level. It is also designed to address many of the criticisms directed at 4.x versions of the product, such as its limited scalability and the many problems it had serving Web sites.

A big advantage of using Notes is platform support. Lotus has ported the product to more platforms than either of its main competitors, running the server on NT, OS/2 and a variety of Unix platforms including AIX, Solaris, and HP/UX. There is also talk of a Linux port. Client platforms are currently more limited, but with the moves Lotus has made with the product, this is becoming less relevant.

We were impressed by what we saw in the latest iteration of Notes. It includes some real improvements, but some of the Notes faithful may not be impressed with the direction Lotus is taking.

The client

The Notes client has received a serious upgrade from previous versions. The



ancient 'workspace' has gone, replaced by a slick new look and an Outlook 98-style view. On the other hand, the client is still not the smoothest piece of software available, and the promised multithreading has not eventuated. The client is not much lighter than the somewhat bloated and clunky 4.6 client, especially when you factor in the designer (see below).

Users of Notes 4.6 and previous versions will be familiar with the utilitarian workspace - a simple framework in which every task, including mail, is treated simply as an application which is accessed by double-clicking on an icon in the workspace. A more complex framework has replaced this system in Notes 5.0, similar in many ways to common Internet and mail clients, with back, forward, stop and reload navigation controls to boot.

Databases, Web pages and Notes applications, including mail and calendaring, are now accessed via a group of icons located on a think frame on the lefthand side of the screen. Links to Web pages and Domino databases are treated indiscriminately in this frame, so a folder set up by a user could have links to Web pages and applications within the same folder. Similarly, searches can be performed universally on both Domino databases and Web pages.

The rendering of Web pages is now thankfully assigned to the IE engine, and it is much quicker at doing this than the previous versions of Notes (which could also use IE, but was painfully slow). The level of integration in the beta we looked at left a lot to be desired, however. The navigation controls, for instance, didn't work within the context of the browser, and actions like 'Open in new window' actually fired up IE. We hope this is fixed in the final version.

Instead of using either an MDI interface or separate windows for open documents and databases, the new client uses a tabbed interface to switch between open documents. Some will find this welcome, others will not

When APC installed the product, it upgraded beautifully over a 4.6 install of Notes, placing the workspace and favourites configuration in folders on the menu on the left-hand side of the screen. easily accessible as pull-out menus. It also imported bookmarks from Internet Explorer and Netscape Navigator, creating link folders with the others on the left-hand side of the screen.

Perhaps to its detriment, the client has lost focus as an application framework, becoming, well, Outlook. Its primary purpose is now to be an Internet client, supporting the latest mail protocols, Web access, calendaring and surfing. This does make the client more appropriate for organisations which are not exclusively Notes, or those which do not even run Domino at all (but then, why would you bother?). It all makes for a better client for Webified Domino applications - but a little annoying if one's primary use is native applications. That said, the client can still run 'legacy' Notes applications perfectly.

The Administrator

For Notes administrators finding no other reason to upgrade to Notes 5.0, the new Administrator should be just about enough to justify the cost. The Administrator is a godsend for Domino admins - it takes a previously clumsy, haphazard framework and replaces it with a simple application for managing groups of Domino servers. It

Lotus Notes/Domino 5.0

- Can do pretty much everything the other packages do, plus more;
- Excellent design interface;
- Integrates Web, messaging and business applications very well.

Cons

- Bloated and not terribly quick. High memory use;
- Some configuration options are not particularly intuitive;
- Given to crashes and instability (Note: we looked at a beta of Version 5.0, but 4.6 also had these problems).

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works best when managing 5.0 servers, but can actually work with most recent versions of Notes/Domino.

From the Administrator, you can manage people and groups for messaging, address books, server replication, cluster configuration, server tasks, performance logs, monitoring logs and so on. It can even manage files within the directories designated by Notes, so you can check available disk space and database sizes, as well as deleting or shifting databases.

Probably the other major reason to upgrade to Notes 5.0 is the Designer. Lotus' developers have done a fantastic job of taking the already excellent design interface and extending it to make developing Web-ready Domino applications much easier. The new Designer (now divorced from the Notes client) has a more powerful interface for developing compelling Web sites from Notes applications. With the Designer, framesets (at last!) and site outlines can be created, along with non-form-based pages.

Apart from its much improved interface and support for HTML features, Notes 5.0 Designer also sports a major new feature: support for Java. Within the IDE, developers can now use both Java and LotusScript to develop applications. Some well-implemented Java interfaces to Notes functionality are naturally supplied. CORBA and OLE are also supported. And as IDEs go, it isn't a bad one, offering some features that several purpose-built IDEs would do well to copy. As an added bonus, applications created can be previewed in Notes, Domino, IE and Netscape at the click of a button.

There are too many other features in the Designer to list here. Suffice to say, it is a real blessing for Notes developers involved in the development of Web applications. Others may not find the improvements as spectacular as we did, although it's hard to criticise the changes that have been made.

Domino Server

As you'd expect from a server upgrade, most of the advancements have happened under the hood. An effective 'install wizard' guides the administrator through the initial configuration, but after that, the system is best managed using the administration tool.

The biggest change from previous versions is probably the database structure. With IBM's assistance, Lotus has increased the certified database capacity from 4M to 64M, making it an effective

competitor for the Platinum/SQL combination that Microsoft plans to push.

Other changes to the server product include support for native MIME, Post Office Protocol 3 (POPS3) and Internet Message Access Protocol 4 (IMAP4) for better mail interoperability. The server also supports SSL and LDAP (Lightweight Directory Access Protocol). It uses a proprietary but effective authentication scheme, based on password-protected ID files that need to be with the client (a new capability is the delivery of ID files to mobile users).

To overcome the previously laggard performance of Domino's HTTP stack, the server can now use the IIS stack on Windows NT systems, although the native stack is still an option. For enterprise users, Domino 5 supports failover and load balancing technology for mail and other Notes applications, along with automated billing services.

Nathan Taylor

Distributor Lotus

■ Phone (02) 9350 7700
■ Online http://www.lotus.com/

■ Price TB

■ In short Notes has a lot of features — and the new version builds

upon these with greater support for standards.

Exchange 5.5

MICROSOFT

If there is one area in which Microsoft has invested heavily during the last two years, it is groupware. The company has waged a sometimes bitter and ugly war with its main rival in this space — Lotus. So gaining groupware mindshare has become a top Microsoft priority.

Microsoft does not combine all of the traditional features of 'groupware' into one package like Lotus does with its Notes/Domino product. Instead, Microsoft provides 'solutions' which come in the form of bundles of different applications, the end result being enterprise messaging and collaboration.

The messaging component of groupware is the backbone providing the transport for different types of information. Messaging in the Microsoft world comprises the server component, Exchange, and the client, Outlook. The current version of Exchange is Version 5.5 Service Pack 2, and at the time of writing, Outlook 98 was the latest client version available for the PC and Macintosh platforms.

While Exchange can be set up as a POP3 Internet mail server, the full benefits

of collaboration and messaging are accessible using the Outlook client. Outlook is a feature-rich Personal Information Manager, and when tied together with the Exchange email system, provides a sophisticated calendaring and messaging system. Overall, a rich text environment for sending emails within an organisation.

Connections

To talk to other mail systems, Exchange uses a series of connectors which are available for Lotus cc:Mail and Notes, Microsoft Mail, Internet mail, Internet News, IBM OfficeVision/VM and SNADS. There is also an X.400 connector that is used to allow different Exchange sites to talk to each other. The second service pack for Exchange 5.5 enables calendar sharing between Exchange users and Lotus Notes, Novell GroupWise and Office Vision/VM users.

Replication is still not one of Exchange's strong points, remaining less sophisticated than either GroupWise or Notes. Users can synchronise their mailboxes, but they are required to replicate their entire data stores.

Outlook has great folder-management and message-filtering capabilities and views in Outlook 98 are heavily customisable and easy to manage. The Rules Wizard in Outlook 98 is very useful for setting up filters and junk email traps. While Outlook 98 is a great email interface, there's still the option to use Word 97 and your email editor for rich text messaging.

Microsoft's solution to provide collaborative applications is the capability to develop forms in Visual Basic and provide them through public Exchange folders. Developers can also use Outlook forms, C++ or MAPI to develop custom applications in the Exchange environment. The data for

Microsoft Exchange Server 5.5

Pros

- Relatively easy to configure and manage;
- Able to talk to all major LAN-based messaging systems;
- Can support a large number of users through clustering.

Cons

- Limited multiplatform support;
- Multiple Microsoft applications are required in order to supply the full spectrum of groupware features;
- Replication features are not as advanced as Lotus Domino.

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the forms can tie back into any ODBC data type, such as Microsoft SQL server.

Microsoft developed the Collaboration Data Objects with Exchange 5.5. These development libraries are used with Active Server components to write Webscheduling applications. Online meeting support is provided through the Microsoft Chat service. This is an IRC server that comes as part of Exchange.

Exchange supports SMTP, POP3 and IMAP4 protocol compliant mail client users. Internet news is viewable via Exchange public folders. Outlook users access a public folder to view NNTP newsgroup content and Exchange provides the ability to publish and receive NNTP newsgroups. If a client supports LDAP 3, it can perform lookups on the Exchange name and address book.

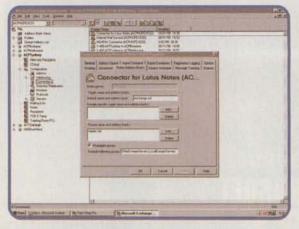
To provide Web access to email under Exchange, you need to install Microsoft Internet Information Server 4.0. Through the use of Active Server Pages, Exchange users can view most of their Exchange information from a Web browser. This feature is known as Outlook Web Access (OWA). Through OWA, any platform that has a browser and supports Java can access an Exchange mailbox. It should be noted that mailbox access using OWA is limited to email and the calendar.

Security

Exchange uses the Windows NT security model to provide user authentication. An Exchange mailbox has a corresponding Windows NT user account, Permissions for mailbox access and administration uses are provided by the Windows Access Control List. Exchange data is encrypted using RPC encryption or SSL over SMTP, if a third-party client is being used.

Microsoft has implemented individual encryption keys in Exchange and these are managed using the Exchange Key Management Server. After Service Pack 1, Exchange clients could use Internet standard X.509 V3 certificates to communicate securely with S/MIME compatible Internet mail clients.

User administration is performed in the Exchange Administration console, which provides a tree-like view of an Exchange site, including server, recipients, and connector and configuration details. All of the configuration parameters for the servers and connectors are set here. Other features such as send-on-behalf and delivery restrictions can be set in the user properties box. The Exchange Administration console can be run from any Windows NT Workstation that has appropriate permissions.



To measure server performance Microsoft has written counters specific to Exchange to be used with the Windows NT performance monitor. Using available reporting tools, it is possible to get detailed reports on messaging usage statistics.

Microsoft has worked hard to make Exchange a scalable product - earlier versions could not handle large numbers of users. The Enterprise version of Exchange will theoretically support an unlimited number of users, dependant only on the hardware. Since Exchange is tied into the Windows NT security model, NT domain sizes become a limiting factor as well.

Migration

Microsoft has provided myriad migration tools to encourage IT managers to move from their aging email systems. cc:Mail, Notes, Internet, MS Mail, Collabra Share and GroupWise mail users can all be migrated to Exchange using the Exchange Migration wizard. This wizard does an excellent job of migrating from these systems using default settings.

On the client side, Outlook 98 imports contact and schedule data from ACT. dBase, CSV files, Lotus Organizer, Microsoft Schedule and SideKick. In its effort to out-migrate Lotus Notes, Microsoft recently released a set of tools to allow the migration or coexistence of Notes applications and databases with Exchange. This process is not 100% successful, as some finetuning using Visual Basic and Lotus Script is usually required.

Windows 2000 (formerly NT 5) will see the long-awaited introduction of Microsoft's Active Directory service; the company's answer to calls for a Metabase similar to Novell's acclaimed NetWare Directory Services. Exchange is the first application written by Microsoft to work natively with Active Directory. This promises simpler management of user and messaging databases. Outlook 2000, as part of Office 2000, promises more advanced team workflow and tracking features.

The next version of Exchange (code-named Platinum) will contain improved scalability, management and clustering features. It will also integrate voicemail and email, so that Exchange can tie into a corporate PABX system. In the interoperability arena, Platinum will include support for HTTP Distributed Authoring and Versioning protocol, an

extension to the HTTP protocol.

The Microsoft Exchange-based collaborative environment is best suited to sites with existing Microsoft infrastructure. The wealth of migration tools available makes migration an attractive option, and this alone means Microsoft is taking many installed seats from Lotus and its other competitors. Microsoft reports a number of sites with more than 100,000 Exchange users, while the basic Exchange/Outlook package is also being found installed in small workgroup situations.

Exchange 5.5 is the first version to offer a serious threat at the enterprise level in the groupware sphere. Tied in with all of the other Microsoft components, Microsoft can now go head-to-head with Lotus Notes on features and not come out with egg on its face.

Lachlan Botticchio (MCSE) is a systems administrator at Australian Consolidated Press. He can be contacted at lb@acp.com.au.

■ Distributor Microsoft Phone 132.058 Online http://www.microsoft.com.au/ III Price Microsoft Exchange Server 5.5, \$5,899 (25-client licence); Microsoft Outlook 98, \$189 In short This is the first version of Exchange to pose a real threat to Lotus Notes.

GroupWise 5.5

NOVELL

Novell has added some impressive features to GroupWise 5.5, including improved system administration, a simplified installation process, and the elimination of miscellaneous bugs during installation.

The integration of Internet standards now allows access — using virtually any

Internet client — to all messages, documents, voice mail, faxes, calendar information, tasks and notes from a single, easy-to-use environment.

This means that users can better manage their own work, and can select individual documents, conversation threads, or folders to be shared by other users, groups, or even the Internet via the Web Publisher component. Third-party applications can be added to integrate fax capabilities, a variety of voice mail systems, and also to integrate PDAs (personal digital assistants) and a range of other features.

Installation is a snap, and the installation wizards make it easy enough for just about anyone to plan and install a basic system. Administration is through the familiar Windows NDS administrator tool; everything is tightly integrated into NDS, making daily administration low maintenance.

GroupWise 5.5 has had more than 150 enhancements since Version 5.2. One improvement is the ability to share (readonly or read/write) Personal Address Books, allowing multiple shared address

Novell GroupWise 5.5

Pros

- Easy for end users to learn:
- Easy for system administrators to manage;
- Tightly integrated into NDS.

Cons

- No NNTP support;
- Less third-party support than Notes or Exchange:
- Relatively difficult to modify; there is no custom forms creation.

books with non-native GroupWise users. It also has improved Internet mail and attachments handling, which allows users to attach vCards and send embedded HTML documents in GroupWise.

Previously, system administrators had to create complex rules to handle Internet mail. GroupWise 5.5 incorporates those rules, and improved security standards provide support for S/MIME (Secure Multi-Purpose Internet Mail Extensions), making it compliant with the Defense Messaging System (DMS) standards which were set up by the US Department of Defense to provide high-level data encryption and security for Internet messaging.

Components

Among other things, GroupWise 5.5 comprises messaging, calendar, to-do list, notes, proxy access, document management, workflow and remote access components. The GroupWise 5.5 client software is available for 16-bit and 32-bit PC, Macintosh and a host of Unix platforms. It should be noted that functionality is severely limited on 16-bit Windows.

It is necessary to have at least one Net-Ware server (Version 4.1 or higher) in order to install and manage GroupWise 5.5. The server side of GroupWise uses an MTA (Message Transfer Agent) and POA (Post Office Agent) to process information. GroupWise is structured around the concept of Domains, Post Offices, and Gateways. A basic system would comprise a single Master Domain and a single Post Office, while a more complex

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GroupWise is most suited to environments that use NetWare as a file and print server base. In such environments, Group-Wise requires fewer hardware resources than Notes or Exchange, which would need additional Unix or NT servers to run. Typically, GroupWise can reside on the same NetWare server used for file and print sharing, often requiring only minor RAM and hard disk upgrades. Novell has benchmarks showing a single NetWare server with a Pentium 166 and 256M RAM running 200,000 users and a throughput of at least 1 million messages a day. It is very well scaled to handle multiple sites connected via WANs and standard telephone lines.

Although GroupWise 5.5 is a featurepacked product out of the box, it does lack some of the flexible, additional enhancements of Lotus Notes, and it has far fewer third-party plug-ins than Microsoft Exchange (31 compared to 311, according to Microsoft). Although it is slightly more difficult to implement, an experienced programmer can make modifications with the SDK.

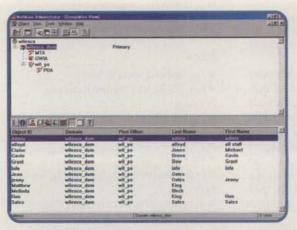
GroupWise 5.5 provides a sophisticated electronic messaging backbone that goes beyond what many people think of as email. Among other things, different priority levels allow high-priority messages to display with a different colour in the recipient's inbox and, unlike Internet mail, are handled on a higher priority basis by the message server.

On the downside, it is not possible to set disk quotas for end users, which allows them to have potentially large and difficult-to-manage mailboxes. It's possible to force an auto-archive or auto-deletion, but this isn't always appreciated.

Standards

The GroupWise Internet Agent provides full POP3, IMAP4, SMTP and LDAP compatibility, allowing end users to access mail with standard Internet mail programs including Netscape Communicator and Outlook Express.

It is possible to look up entries in address books using LDAP, and view items stored in personal or public folders with IMAP4.



GroupWise 5.5 also supports messages with embedded sound, graphics, HTML and vCards much better than previous versions.

Several products such as Netscape Messaging Server and Pegasus Mail offer plain old email on a NetWare server. But what puts the 'Group' in GroupWise is its ability to share and collaborate with others through PIM (personal information manager) features such as a calendars, to-do lists, notes, discussion threads, shared folders and address books. 'Proxy' access can be set up to calendar, mail and tasks for users or groups within an organisation allowing restricted access.

The document management features of GroupWise allow users to save documents in a document library that can be shared with users or groups quickly and easily. The new WebPublisher feature also allows any of these documents to be automatically published to the Internet/ intranet in HTML format, empowering even the least computer-literate person to become a Web publisher.

GroupWise 5.5's Workflow component is worth investigation if only to streamline and reduce paperwork. It allows the elimination of much of the transit and processing time associated with traditional paperwork - particularly in a large organisation — by using electronic signatures. As with any item in the Universal Mailbox, it is also possible to tell the status of a message at any time. You can, for example, find out where a purchase order is being held up and phone or email the transgressor to expedite the process.

There are several ways to remotely access a GroupWise system. The remote client allows offline use of a GroupWise system and is an efficient way to work if you use a notebook. A standard PPP connection or Novell's proprietary ASYNC gateway can be used to synchronise your remote system.

Although GroupWise 5.5 contains significant improvements, it still lacks some useful features. These include: the ability to add documents to the document library using a Web browser; restriction of the size of incoming and outgoing Internet messages; the ability to use Microsoft's Outlook Client to work with calendar, tasks and notes: and NNTP support for shared folders to allow any Internet news client on the Internet/ intranet access to discussion threads. It could also do

with vCalendar scheduling standard support for interoperability between other PIM/Groupware products; iCalendar support to provide interoperability between other PIM/ Groupware products' free/busy searches; full clustering support on Net-Ware 5; more third-party applications; better contact management features such as those found in programs like Symantec's ACT. It also lacks an easy-to-use form design tool to make custom forms; more sophisticated document management functions and options to use other thirdparty document management products with GroupWise; and the inclusion of Novell and Netscape Web server software and all Java component support.

But overall, the features, reliability and scalability of the GroupWise products are impressive. It is generally easy to install, maintain, learn, use and administer. GroupWise 5.5 supports all of the basic features necessary to increase productivity and encourage team collaboration. At the end of the day, it boils down to whether the product can improve user productivity without putting a heavy strain on IT staff. In the case of Group-Wise 5.5, the answer is yes.

Ronald Rosenbaum is a senior technical consultant at Advanced Technical Solutions. He can be contacted at ron@ats.au.com.

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Looking for alternatives to packaged groupware? It's possible to tailor a solution to meet your business requirements. By Brad Thurkettle

DIY groupware: We have the technology

he term 'groupware' is applied to packages that assist people to work together better. The most popular groupware application is email, but there are many others including calendaring and scheduling, online conferencing, discussion groups, document management and workflow. In the table on page 125 we've summarised various possible groupware solutions from the most basic, right up to the big three proprietary commercial systems already reviewed here in detail.

At the lowest level, an individual or small organisation can get away without having a groupware server; all that's needed is Internet access. An email address can be obtained from a Webhosted email provider such as Hotmail or Yahoo, which can also set up limited online calendar services. You can create discussion groups using Web-based list providers such as Coollist (http://www.coollist.com/). There are also Web-hosted chat sites where private business conferences can take place, and you can use other free Internet tools like ICQ for conferencing. Bear in mind, though, that some of these providers don't allow commercial organisations to use their resources.

The advantages of Web-hosted solutions are cost and simplicity, but the disadvantage is that you are dependant on your Internet connection, and it doesn't look professional having your company address at a Web host.

Naming rights

The next step is to have your own domain name, so you can have addresses like bob@mycompany.com.au. Having your own email address means you need good client software. One option is Outlook 98, which is part of Microsoft Office. This connects to any Internet email account and includes a calendar for scheduling and a journal for document tracking. Meeting requests can be sent by email without the need for a specialised server and confirmed



meetings are entered into the calendar.

Monthly fees for email accounts and a lack of an organisation-wide directory of email names and addresses make individual email accounts with an ISP suitable only for small organisations without inhouse expertise.

The last step is to set up your own groupware server - your choice may be influenced by your operating system preference. Most groupware applications run on Windows NT and some varieties of Unix. Not surprisingly, Microsoft Exchange runs only on NT. GroupWise is tied to Novell's NDS which runs native on NetWare, but it can work with Novell's NDS for NT, or NDS for Solaris, or Caldera's NetWare for Linux.

Linux is an example of open source software — its source code is available free to be used and possibly improved and

redistributed by others. There are many open source solutions available to help you start building a groupware server. Examples other than Linux include Apache's Web server and Netscape's Mozilla. Linux-based systems are very doit-yourself, and require significant expertise - installation and configuration of such systems is not a simple affair if you've never used Unix. So if the only experience you've had is setting up an NT server and installing productivity applications, you would be best advised to spend time familiarising yourself on a test server before deploying a production server.

Another advantage of open source's cost is that because user numbers are unlimited, you can add users and email accounts without needing to track how many licences are in use. Reliability is also very good.

Groupware alternatives: Scale to suit

Solution	Examples	Capabilities	Costs	Advantages	Disadvantages	More information
Free Web-based nosts	Hotmail, Yahoo, Netscape Netcenter, Coollist, ICQ*	Basic email, discussion groups, calendar conferencing	Internet access	Low cost, no internal server required, no hardware or server software costs, only browser software required	Cannot use your own domain name, no central directory listing of users, Internet access required, limits imposed by host, increased Internet access charges if paying \$M, unwieldy/unprofessional for medium to large companies (25 employees)	http://www.hotmail.com/ http://www.yahoo.com/
ISP hosted email accounts	Most ISPs	Basic email, discussion groups, shared calendars, conferencing, Web servers	Extra email accounts from \$5 to \$10 per month on top of Internet access	No internal server required, no hardware or server software costs, choice of groupware clients, can use domain names	Can be expensive for medium to large companies (25 employees), ties organisation to that ISP making it difficult to change ISP, Internet access required for internal email, increased Internet access charges if paying \$/M	http://www.bigpond.com.au http://www.ozemail.com.au
Open source solutions	Linux, sendmail, Mozilla, Apache	Basic email, discussion groups, shared calendars, conferencing, Web servers	Server hardware, Internet access	Free server and OS software, number of users/accounts only limited by capacity not licence, many solutions can mix-n-match products, good support via Internet newsgroups and Web pages	Requires inhouse or hired expertise to set up and administer, support from professional companies rare	http://www.linux.org/ http://www.mozilla.org/
Commercial Internet standard based solutions	Netscape SuiteSpot servers, Sendmail Pro	Email with directory, discussion groups, shared calendars, conferencing, Web servers	Server software and hardware, Internet access	Usually cheaper and scales better than proprietary solutions, speaks native Internet protocols so no need for gateways to Internet, mix-and-matches with other Internet protocol products	Licence costs per user, requires inhouse or hired expertise to set up and administer	http://www.netscape.com/ suitespot/
Proprietary solutions	Exchange, Notes, GroupWise	All-in-one client, single login, email with browseable directory, document management, workflow control	Server software and hardware, Internet access, server OS costs	Well supported by suppliers, setup usually simpler and there are numerous trained personnel that will be familiar with the system, incorporates most groupware features, includes custom client software	Most expensive option, licence costs per user, Usually tied to supplier's OS, inability to mix clients and servers, reliant on primary supplier to supply that feature, requires gateway software to connect to Internet (now shipped as standard), features specific to that solution may not work when communicating with other servers, hardware requirements usually larger than Internet standard based systems	http://www.microsoft.com/ exchange/ http://www.lotus.com/notes http://www.novell.com/ groupwise/

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A real world implementation

About two years ago our organisation, Publicis Communications, was looking for a groupware solution to service 150 users spread over three locations. To this end we created a list of criteria for our preferred solution. It would have:

- One system for internal and Internet email;
- A central directory for usernames and email addresses, preferably browsable;
- The potential for remote network managers to administer their own users and be easy to install and manage;
- Minimal hardware requirements preferably one central server without any need for servers in each branch office:
- Interoperability; we needed a cross-platform solution that wouldn't tie our organisation to one OS.

We looked at Exchange, Notes and Netscape SuiteSpot as possible solutions.

immediately. There were no features disabled and we could evaluate it for 90 days before purchase. Based on the requirements listed above and better pricing, we went with Netscape.

We have 150 users on a Dell PowerEdge 2200 with Pentium II 233MHz, 128M RAM, 8G hard disk drive, Windows NT 4.0 SP4, running on 100Mbps Ethernet. It is running Netscape Messaging Server 3.62 and Netscape Directory Server 3.1.

We use Outlook 98 on Windows 95 PCs and Outlook Express 4.5 on Macintoshes. Users do not have a full browsable list of other users, but they can search for internal users with the LDAP search tool in Outlook, and search any of the Internet LDAP directories. Outlook 98 also allows our users to send Meeting Requests via email internally or to external clients, which become bookings in

> their Outlook Calendar when accepted. Users can also share calendars and address books.

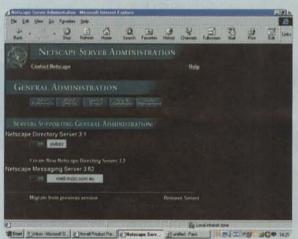
Administration can be done from anywhere using any Web browser with appropriate passwords. Handling of multiple domain names and email addresses per account is standard. The Netscape solution does not rely on the NT domain structure, so it was not necessary to purchase a 150-user NT licence — a cost saving

over Exchange. We will probably not upgrade to the Netscape Calendar server as the Outlook 98 client can handle most of the scheduling issues. For online conferencing we are investigating Microsoft NetMeeting.

On the wish list is a single login via an integrated directory for groupware, file and other services. This may be achievable soon, with the push for Directory Enabled Networking via Novell's NDS and the promise of power from Microsoft's Active Directory.

The solution described above is not necessarily the best. Rather, it's an indication of what was suited to our needs and

Brad Thurkettle



Exchange and Notes were about \$15,000 and \$20,000 respectively. The full Netscape SuiteSpot servers were about the same price, but at the same time allowed for the purchase of SuiteSpot Messaging Server bundled with a Directory Server for roughly half that, and an upgrade to other components such as the Calendar server and Collabra server later.

Notes offered a much more sophisticated development environment than the other solutions, but without the budget or expertise to implement these features it seemed to be overkill.

Netscape allowed downloading of fully functional software from its Web site, and we were able to begin testing

Standards are another important feature to look for in a groupware solution. Internet standards are the protocols used by servers on the Internet, protocols such as SMTP, POP3, IMAP, LDAP and MIME. This is important when email is exchanged over the Internet. Some servers that use their own protocols internally need to translate messages between their internal format and a format suitable for transmission over the Internet. These translations can cause problems and result in a bottleneck, particularly with large installations. You should also be looking for Internet standards to ensure the highest possibility of the software working with other packages you may need.

Crossing boundaries

Beyond open source software are commercial implementations of Internet standard solutions. Examples include Netscape SuiteSpot servers and Sendmail Pro. Licensing of these solutions is usually per server based on the number of users. They cross the territory between open source and proprietary commercial solutions, with the common ground being their native implementation of Internet standards.

The proprietary (Exchange, Notes, GroupWise) solutions usually rely on bundled gateway software to connect to the Internet. Their advantage over open source is that they're from an organisation that can provide support services such as maintenance contracts and training courses funded by their licence fees.

These three big commercial groupware applications have a lot going for them. For starters, they are fully supported. They offer features not found on the standard Internet-based solutions, and there are many third-party products that provide additional features. Importantly, many trained integrators can support them; you won't get blank looks when you mention that you run Notes, Exchange or GroupWise.

The downside? Cost. Even for volume purchases, licence fees of over \$100 per user are common. Plus hardware requirements are usually higher than for Internet standard solutions — the big three would probably run about 500 users per server, whereas a similar Internet standard server could handle 5,000 users.

Brad Thurkettle is national IT manager at Publicis Communications. He can be contacted at thurkettleb@publicis .com.au.

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CONTENTS



elcome to Workshop, the section dedicated to bringing you all manner of tips, interesting information and do-it-

yourself tutorials. Within these pages you will find useful shareware, informative operating-system-specific columns and easy-to-follow programming tutorials.

The response to the Pocketbook series has been phenomenal and we have a whole range of topics planned - from networking to Webmastering and publishing. If there is a specific topic you'd like to see covered in Pocketbook format, email amills@acp.com.au and let us know!

Tech Talk

129

Technobabble explains networking protocols, and Step by Step presents some tricks to get more from your digital camera.

Operating Systems

Windows 98 explores the Windows Update online facility; OS/2 Warp examines MMPM/2 and the multimedia applications bundled with the operating system; Mac OS delves into the new AppleScript features of Mac OS 8.5; and Linux does some clockwatching.

Programming

C++ describes how variables are used, and Java completes its digression into the world of client/server applications.

Shareware Summary

All the files mentioned here can be found in the Workshop section of this month's apcmag.cd.

Get involved

All files mentioned in Workshop can be found on apcmag.cd or downloaded from our Web site at http://apcmag.com/. You can join one of our online discussion forums to discuss technical issues or just voice your opinion on any related topic. Workshop is a reader-input section.

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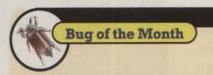
Ashton Mills and Stephen Withers, Workshop editors

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, examples of features that function poorly, or procedures for crashing a particular application. Anything and everything that is buggy deserves

Send us your favourite bug via email to bugs@acp.com.au or snail mail, and you'll be in the running to win your choice of development or application software from Workshop's prize cupboard. The prizes change each month to ensure there's always something interesting for avid bug-hunters. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your

The winner's name, along with details of the bug, will appear in the Bug of the Month column in the June edition of APC. So start hunting!



2000 zero zero party over, oops, out of time So 2night I'm gonna party like it's 1999 - Prince (or whatever he calls himself these days)

Finding date-related bugs in software this year is not the hardest thing you'll ever do. They're appearing with monotonous regularity - annoying just about everybody (except people like me who get paid lots of money to fix them). But this month's bug, submitted by Robert Mapson, is just a little special: Robert's found a date-related bug in his Y2K testing software.

a=140	b=100 c=24
Click on	e of the formulae below:
a-b-c=	16
a-(b+c)	-9884

Our hero downloaded a utility from the Acer home page to validate his computer's BIOS. The BIOS was OK, but the utility was a little dodgy. The output looked something like this:

Acer Bios Version Detect Utility (Version

Acer Bios Version: V2.0

Acer Bios Revision: 01-F2 Acer Bios Release Date: 51/0-/2060 Acer Bios Model ID: ACR16 Acer Bios Serial No: ACR1600-M07-960510-R01-F2

Now about that release date . . . If you look carefully you'll see that the utility has pulled the release date out of the serial number, but offset by one.

Still, Robert can now rest easy that his BIOS is OK because this utility would have been thoroughly tested - wouldn't it?

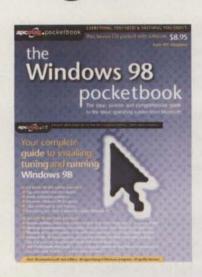
For his pain and suffering Robert wins one of our great Workshop software prizes, but we'd better ship it quickly so he gets some use from it before December 31 just in case. Michael Smith

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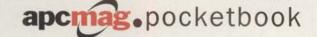
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TECH TALK

Get to know your favourite protocols a bit better.

By Nathan Taylor

Technobabble

large number of network pro-

tocols have been developed since the first computer networks appeared. Many of these were proprietary solutions such as DECnet and to an extent token ring. The latter may have had many technical merits, but it failed to achieve broad acceptance. Others were developed with versatility in mind, but have since been cast into very specific roles. Fibre Channel, ATM and even SCSI have capabilities beyond those for which they're commonly used - ATM is more than just a fast network technology, while SCSI and Fibre Channel are more than just disk interfaces. For others, such as the Fibre Distributed Data Interface (FDDI), interest simply waned in the face of technology that was cheaper or easier to implement.

Of the many protocols developed over the years only a few have really become standards, and they now dominate the networking world. In the LAN/layer 2 space, Ethernet is by far the dominant standard. At the third and fourth layers of the OSI model, IP and TCP dominate. Token ring and IPX/SPX are fading now, but were prevalent in the past. Then there is the young upstart ATM, which so far has failed to realise its potential, but does have a lot to offer.

Note: I'm assuming you've read the past three Technobabble articles. They lay the groundwork for this month's discussion, so if you missed them see **apcmag.com**.

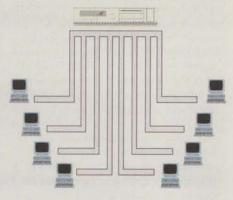
Layer 2 protocols

Ethernet is not an elegant or efficient layer 2 protocol, but it works, it's cheap and it's easy to set up. As a result it is the most dominant LAN technology in use today.

Created in 1973 by Xerox, Ethernet was originally known as DIX (DEC, Intel, Xerox), but the standard is now controlled by the Institute of Electrical and Electronics Engineers. The way Ethernet works is best described as anarchistic. Lines are shared between nodes by an essentially first-in, best-dressed method.

The technical name for this is Carrier-Sense Multiple Access/Collision Detection

Token ring wiring concentrator



The topology of token ring networks is actually a collapsed ring that looks like a physical star. Each device is connected to a token ring wiring connector by a twisted pair cable with two wire pairs, one for inbound traffic and one for outbound traffic.

(CSMA/CD). A computer that wants to send a message on the network must listen in to the cable and wait for a break in the traffic. When it detects a break, it can send a small chunk of data out onto the line. If it detects a collision with data on the line, it will cease transmission and wait before trying again. It works best when packets are small. On very congested networks, CSMA/CD can cause problems, because frequent collisions force a lot of retransmissions and delays.

Other methods of collision detection have been proposed and used at times, although not in standards-based Ethernet. AppleTalk, Apple's network protocol, uses a method called CSMA/Collision Avoidance (CSMA/CA) to overcome collision issues. Intel proposed CSMA/Deterministic Collision (CSMA/DC) which switches to a Time Division Multiple Access (TDMA) system when collisions occur. TDMA systems are commonplace in telecommunications - time slices are allocated to devices on the network, enforcing rules that prevent collision. But this can create redundancy. There's also CSMA/Collision Elimination, which uses another slightly different algorithm based on priorities to determine who gets to use the line.

Ethernet usually runs at 10Mbps across twisted pair copper wires (10Base-T), and at

different speeds across various types of coaxial wire (including 10Base-5 or 10Base-2). In reality, a 10Mbps Ethernet network runs at about 4Mbps across most corporate networks. The number of addresses supported by Ethernet is usually 48 bits, so a large number of clients can be supported on an individual network.

There are also standards called Fast Ethernet (100Base-T) and Gigabit Ethernet, which are backward compatible but support far higher packet rates than 10Mbps Ethernet. These were developed simply because the hardware was developed to support higher speeds. Fast Ethernet runs at a theoretical 100Mbps, while Gigabit runs at 1,000Mbps. The latter is usually too expensive to go to the desktop, and is used for backbones (line segments which connect sub-networks and are expected to carry most of a network's traffic). Hewlett-Packard developed a proprietary equivalent of Fast Ethernet called 100Base-VG, but it has almost disappeared with the wide availability of Fast Ethernet.

Token ring remains a good technology that was never really implemented as widely as Ethernet, despite IBM evangelising the technology. Designed in 1969 by Olof Soderblom, it has fallen into obscurity today, but it is still used as an example of how a ring topology might be formed.

Instead of letting devices try to find their own free space on the line, token ring uses an electronic token that is passed from device to device in a ring. The token notifies the computer that it has permission to communicate and gives the device a chance to add information to the network. If it adds information to the network, the token is set to 'busy'. It then navigates the ring, and delivers data to the correct recipient before returning to the sender to indicate the data has been sent. The sender then frees the token and it begins to circuit the ring again.

This obviously eliminates contention issues, and can deliver a bandwidth of 4Mbps to 16Mbps between devices on the ring. In its most common implementation, it uses twisted pair wiring and up to 255 devices can participate in the ring.

Layer 3 and 4 protocols

TCP/IP The Transmission Control Protocol/Internet Protocol (TCP/IP) is the most commonly known protocol. It is the most important protocol in existence today, as it drives the Internet.

It is actually a family of protocols governed by the Internet Engineering Task Force (IETF), and it is constantly patched and re-engineered by the group. It can be broken into two broad parts - IP, which controls the layer 3 aspects of transmission, and TCP which deals with layer 4.

IP's key task is to take care of addressing on TCP/IP networks. In the most commonly used version, IPv4, addresses are 32 bits long, usually represented by four 8bit values separated by periods (for example, 203.18.241.20). This value can be further split into two parts: the net ID, which describes which subnet a device belongs to; and the host ID, which is the individual address of that device of the subnetwork. There is usually a 16-bit seqment of the address devoted to each, although this can vary. The purpose of a subnet mask, which you often have to enter when setting up TCP/IP on a computer, is to describe how many bits are assigned to the net ID and host ID.

Each device on the network is assigned an individual IP address, enabling other devices to find it from anywhere on the network. IPv4 is restricted to 4.3 billion addresses. This sounds like a lot, but when you consider the likelihood of every person and every electronic device being connected to the Internet, you realise valid addresses will run short. This is why IPv6 was invented. IPv6 expands the address space to 128 bits, presumably more than we'll ever need. Clever engineers have found ways around IPv4's limitations. For instance, they have created subnets with 'fake' IP addresses that do not officially exist on the Internet, but are routed through a proxy which translates the IP addresses. Consequently, the uptake of IPv6 has been slow.

Although numbers are useful for computers, they aren't very human friendly. For this reason the Domain Name System (DNS) was devised. The task of the DNS was to translate normal words (such as www.yahoo.com) into IP addresses that routers delivering packets could understand. A system of DNS servers was set up, essentially providing directories of domain names (the words) into IP addresses. In fact, these servers are something of a network unto themselves; if one DNS server does not know the IP address of the requested domain, it will pass the query on to the next.

ATM: The protocol of choice

Completely different rules apply for telecommunications providers. The world's largest networks all belong to telcos, and they need special technologies to deliver services to the tens of millions of clients connected to their networks. Technologies such as SONET/SDH are used to deliver massive bandwidth to far-flung locations.

One of the most important developments by telcos was asynchronous transfer mode (ATM), a set of elegant protocols originally designed for the delivery of multimedia content. ATM does not conform to the OSI standard, blurring the line between LAN and WAN, but it provides superior service to any OSI-based product.

ATM delivers data in small packets, called cells, which are fired off at a rapid rate. These cells are all 53 bytes long, with 5 bytes of header information and 48 bytes of data. Between communicating devices, a virtual circuit is set up, and cells are automatically delivered between devices. This rapid-fire approach makes it ideal for handling low-latency communications such as live voice conversations and video.

Just as important is ATM's class of service

definition. A virtual circuit, once set up, can have a class of service assigned to it, such as constant bit rate services or variable bit rate services. These services can quarantee bandwidth levels between devices or indicate that there are no specific bandwidth requirements and to simply use what is available. Unfortunately, in the real world, these features are rarely used, and ATM is most often used as a highbandwidth backbone service.

ATM was originally designed to work on optical fibre networks at speeds of 155Mbps or more, although work has been done to get it to work over copper wires at 25Mbps for desktop systems. This work includes LAN Emulation (LANE), which enables traditional protocols such as IPX and TCP/IP to work over ATM. Although LANE is not as efficient as pure ATM, it is essential for backward compatibility.

ATM products are expensive because of its hardware requirements, so it is unlikely to be used by anyone other than telcos and large companies for some time. However, ATM is one day going to be the protocol of choice for all networking.

When you set up your computer to connect to the Internet, one of the most important tasks is to point your computer in the direction of the nearest DNS server, so that it can look up these requests (if you don't, then you'll be typing in IP addresses manually; type 203.18.241.20 into your browser and see what happens).

TCP is the most common layer 4 partner to IP. Like IP, it was designed for ARPANet (the predecessor to the Internet) in the early 1970s to provide a stable transmission service. TCP ensures packets arrive in sequence, discovers errors in packets, and requests retransmission if there are errors or if a packet doesn't arrive.

Although you won't see it often, there is actually no exclusive arrangement between TCP and IP. For instance, a protocol called User Datagram Protocol (UDP) is often partnered with IP addressing, for a system known as UDP/IP. UDP works differently to TCP as it is a 'connectionless protocol'. TCP requests a receipt recognition for each packet that is sent; if it does not receive one, then it resends the packet. UDP uses a 'send and pray' method instead that cuts down on network traffic, but is far less reliable. UDP is becoming increasingly important as companies start broadcasting multimedia across the Web and receipt notification

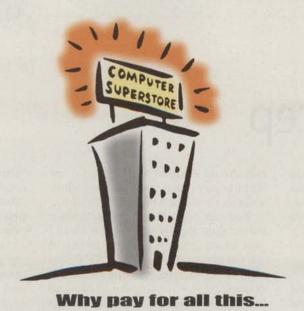
packets become a burden with many clients receiving the data.

The IETF has defined over 100 protocols and standards which fall under the broad banner of TCP/IP. Included are standards for getting it to work over nearly every conceivable type of network. This is because TCP/IP is, and will remain, the most significant networking protocol. Its only real challenger at this stage is ATM (which TCP/IP can also run across), but this won't happen for some time.

IPX/SPX Although it has been written off by nearly everybody, including its creator, Internetwork Protocol Exchange/ Sequenced Packet Exchange (IPX/SPX) remains prominent because it has such a huge installed base. Developed by Novell for NetWare, IPX/SPX was the dominant protocol in the late 1980s and early '90s, until the Internet and TCP/IP came to take its mantle. It is still widely supported in both routers and software.

IPX is the layer 3 part of the duo, and works similarly to IP, providing an addressing and routing system which connects devices across internetworks. SPX is equivalent to TCP, providing packet sequencing information and transmission assurance.

Next month: Know your Internet.





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The nitty-gritty of digital photography.

By Daniel Rutter

Step by Step

here are some tips and tricks specific to digital photography, and if you know them, you'll be able to get a lot more out of your digital camera.

Better batteries

All digital cameras eat batteries much faster than film cameras. Many digital cameras run from AA cells (a battery comprises two or more cells), usually four of them, and

they're renowned for draining a set of alkaline cells after less than an hour of shooting. My Kodak DC120's current draw varies from 200mA (milliamps; 1,000 milliamps make one amp) when it's turned on but not doing anything, to about 1.2A when its LCD is active. It can peak at about 2A right after taking a picture.

According to the specs, an AA alkaline cell has a capacity of about 2.4Ah (amp hours). It should be able to deliver 1.2A for two hours before going flat. Why doesn't it? Alkaline capacities are quoted based on a 'C/20' load - a load that flattens the cell in 20 hours. When a 2.4Ah cell is asked to deliver more than 10 times C/20 by a camera, its voltage drops and its life is greatly reduced. Newer types of alkalines like Energizer's Advanced Formula and Duracell's Ultra cells perform a bit better, but not a lot. Lithium AA cells don't provide value for their price, which is about three times higher, and rechargable alkaline cells are even worse. Don't even think about using cheap dry cells.

Rechargable cells have capacities much lower than those for alkaline nonrechargable ('primary') cells. About 1Ah is a common rating for good nickel-cadmium (NiCad) and nickel metal hydride (NiMH) rechargables. These cells also have a lower per-cell voltage - only 1.2V compared to 1.5V from alkalines. But they handle high output currents much better than the primary cells. Under a 1A load, a 1.2V NiCad will deliver its full rated capacity without breaking a sweat. On the downside, ordinary NiCad chargers take at least a few hours to pump these cells back up again, while trickle chargers take about 14 hours.

You can get a better charger from a hobby shop that handles radio control gear. Many chargers intended for model car battery packs cost about \$100 and have as their minimum setting the 500mA or so suitable for charging small cells - all you need to do is buy a 4xAA cell holder for less than \$2 and put a connector on it that the charger can plug into or clip onto.

Clockwise from top right: A simple AA cell holder; a four D cell holder; battery pack lead with barrell plug; four 950mAh NiCd cells, and one 7000mAh F cell; a 6V battery pack built out of 7000mAh F cells, with Anderson connectors for charging.

(As shown in the top right-hand corner of the above picture). A better charger can also be handy if you adopt my preferred solution to the camera battery problem: the big fat outboard battery pack.

Bigger, better batteries

The simplest such pack is a D cell holder with alkaline cells in it (as shown in the bottom right-hand corner of the above picture). D-size alkalines have a capacity of about 15Ah. They only face about twice

their C/20 load from the average digital camera, and thus deliver more of their rated capacity than do AAs. But you still won't get the duration you might expect from the 15Ah rating.

You can get a four D cell holder from any electronics shop for a few dollars. To connect it to the camera, you'll need a lead that can plug into your digital camera's AC adapter (plugpack) connector.

The easiest way to get a suitable lead is to cut one off a plugpack, but if that doesn't

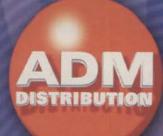
appeal, most electronics shops stock the simple two-terminal 'barrel' plugs most cameras use (as shown in the bottom lefthand corner of the picture at left). Make sure you get a plug with the right inside and outside dimensions.

Putting it all together is a simple soldering job. If you don't know how to do this and don't want to learn, your local electronics technician will be able to do it for you in a few minutes if asked (or paid) nicely. Make sure you get the polarity of the connector right. Most barrel plugs are wired 'tip positive' and the sleeve of the plug is the negative terminal. If you're uncertain, use a cheap multimeter (less than \$20 from electronics stores) to check the output from the plugpack.

The pack I use is made from enormous 7Ah Sanyo Fsize rechargables (as shown in picture at left). In Australia, you can expect to pay around

\$30 each for F cells. The much more common 4.4Ah D cells sell for about \$15 each. and are a more sensible proposition.

Eagle-eyed readers will note that my pack contains not four but five cells. This gives the camera 6V, which means its motorised zoom works noticeably faster than it would with the 4.8V four NiCads. A NiCad pack that delivers less than the rated voltage of a camera's mains adapter should cause no problems, but don't cut it too fine - freshly charged NiCads can deliver more than 1.2V for a little while.



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To build a custom battery pack, you'll need to solder the cells together with wire. Soldering to cells can be tricky—you need a soldering iron with a fairly large tip, and you need to roughen up the ends of the cell a little with sandpaper or a file to encourage the solder to stick. It's much easier to use

'tagged' cells, which have an easy-to-solder tag on each end.

Higher capacity NiCads are not available in tagged versions. To practice soldering to them, use a few old non-rechargable cells first. Tin the wire you intend to use - coat it with solder. Now roughen the ends of the cells, tin them too, and then press the wire you intend to use onto the tinned cell end with the iron. It should all be over in a few seconds. If you find yourself heating the end of the cell for ages, you're doing it wrong.

Once you have the tagged cells, or have learned to solder to untagged ones, arrange your cells the way you want them, and stick

them together. Hot melt glue is good for a battery pack assembly. The cells should be aligned so it's easy to wire each cell's positive end to the negative of the next, with the power cable attached to the terminals on the ends of the line. It's a good idea to splice a connector compatible with your charger into the power cable; otherwise you'll need to make a barrel socket adapter for your charger.

Once you've built the pack and verified that it works, mummify it. I wrap large packs with several layers of cloth-backed gaffer tape. It's hard to beat for durability and price.

Long exposures

A few digital cameras, like my DC120, can do long exposure images. This is a very interesting feature, but to get the best results, you really need to know a trick or two.

First, get a tripod. If you hold your camera by hand for long exposures, it will produce artistically fuzzy results. Every digital camera worth its salt can screw onto the holding plate of any cheap lightweight tripod. This also works with video and film cameras. Even when

you have got a stable camera mount, though, your pictures will still tend to look a bit funny.

The problem with long-exposure digital photography is that cheap digital camera charge coupled devices (CCDs, the image sensor inside the camera)



A typical 16-second long exposure shot. The magnified section shows the bright dots of 'hot pixels'; note also the diffuse glow in the top left-hand corner from the 'warm corner' of the CCD next to its amplifier.

don't do long exposures very well. At ordinary temperatures, they don't produce a perfectly even signal strength — some pixels on the CCD are 'hotter' or more active than others, and the CCD produces generally higher signal levels than it should the closer you get to the warm amplifier connection in one corner. In a long exposure, the hot pixels show up as bright dots and the warm corner has a diffuse bluish-white glow. Editing these artefacts out of the image by hand is extremely tedious.

Fortunately, there's a fairly easy way around the problem. Cover the lens with something light-proof and take a picture with the same exposure time as the one you want to clean up. This will give you only the speckles and glow. Now, in your favourite paint package, subtract this 'dark field' image from the picture you want to clean. In Photoshop, you can do this by loading both images, selecting the dark field image, pressing Ctrl-A (select all) and Ctrl-C (copy), selecting the photo image, pressing Ctrl-V to paste the dark field as a new layer, and then setting that layer's blend mode in the layer palette to Difference.

If your camera's 'warm corner' corre-

sponds to a dark part of the image, this operation by itself should clean up the picture wonderfully. If there's some image detail in the warm corner, though, you'll see an odd negative effect there. You can correct this by making the dark field layer more transparent until the corner looks OK — the speckles

will start to come back, but should still be greatly reduced. You can also make an alternative dark field image with the warm corner faded a bit.

Bear in mind that using high compression settings for long-exposure images will smear the artefacts around, and make cancelling them in this way practically impossible.

Lens protection

It's a pretty cheap and nasty film camera that doesn't come with a lens cap. But a remarkable number of digital cameras don't. Fortunately, many of them do have a standard 37mm thread in front of the lens, so it can take filters intended for camcorders.

A plain piece of glass in a filter holder will serve, but you can do better. Camera CCDs are sensitive to infra-red, and many cameras don't have an infra-red-blocking filter built in. To tell if your camera does, try zapping it with a remote control in a dimly lit room and take some pictures. If you can see the remote control's LED emitter as a blue dot, you don't have a filter built in.

Infra-red filters are also known as 'hot mirror' filters. They're fairly expensive, but they can considerably improve outdoor shots in unfiltered cameras, removing the blue haze of IR light. And, of course, they stop your lens getting scratched.

Get a card reader!

If you're sick of waiting ages for images from your camera to be pumped down a serial cable to your computer, and your camera uses CompactFlash, PCMCIA or SmartMedia cards for storage, consider investing in a suitable card reader. These use parallel, SCSI or USB interfaces, and move your data more than 100 times faster than a serial cable.

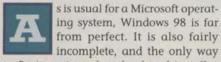
Daniel Rutter welcomes feedback and suggestions at dan@dansdata.com.

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Online updates for Windows 98 and its applications.

By Kieran McNamee

Windows 98



to fix it up is to download and install a

number of bug fixes.

If you have already installed Windows 98, there are a couple of fundamental things that need to be taken care of before you even think about applying additional bug fixes. Converting your hard drive to FAT32 will free up quite a bit of space, and the process also runs ScanDisk and defragments your hard drive. To convert your drive to FAT32 all you have to do is click on Start, Programs, Accessories, System Tools, Drive Converter.

Keeping your hard drive efficient and free from errors by regularly running ScanDisk and Disk Defragmenter is an important procedure to keep your system, and ultimately Windows 98, working smoothly. When running Disk Defragmenter, ensure that you enable the setting to rearrange program files so that your programs start faster.

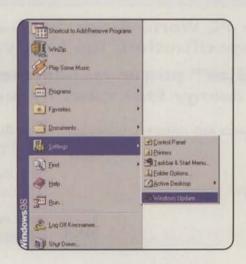
Instead of manually loading ScanDisk and Disk Defragmenter every few weeks or so, you can automate the entire process with the Windows 98 Maintenance Wizard located in the System Tools folder. The Maintenance Wizard incorporates Scheduled Tasks which automatically runs ScanDisk and Disk Defragmenter, and periodically deletes unwanted files that are just wasting space.

Scheduled Tasks not only performs maintenance tasks (such as those previously mentioned), it also lets you configure any other program to run whenever you want it. Tasks can be scheduled to run daily, weekly, monthly, or at certain times, such as when the computer starts or when it is idle.

If you still have Scheduled Tasks in your System Tray, then open it and see if Program Tuning is listed. (If you are like me it may have mysteriously vanished; or more likely, it may have been foolishly deleted.) This utility supposedly rearranges programs so that they start faster. I don't know how effective this is, but there is no harm in scheduling it to run once a week or so. For those of you who can't find this utility in the Task Scheduler you can add it from the following location, \windows\system\walign.exe.

Windows Update

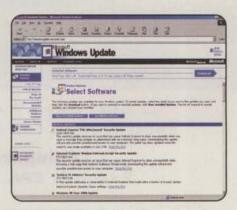
Let's move on to the all-important Windows Update feature of Windows 98. First access Windows Update in the Settings folder from the Start button.



When you select the Windows Update icon you will be taken to the Windows Update Web site (being connected to the Internet at this point in time is a good idea, of course). Before you can select any patches to install, you will be prompted to either register with Microsoft or to log on, using your email address and Microsoft password.

The Windows Update Web site is well designed and fairly easy to use. The ability to see what updates you have already installed on your system is helpful - it prevents you from downloading unneeded files. You will have to allow Windows Update to scan your system to see what items have been installed; however, none of this information is sent over the Internet.

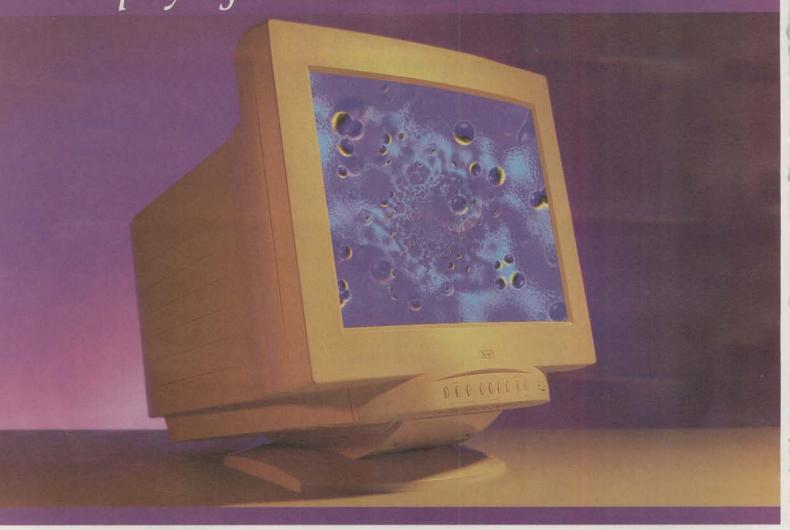
Currently, Windows Update consists of two areas: the Product Updates catalog and the Support Information area. We will be looking at the Product Updates catalog.



The Critical Updates list is displayed at the top of the page and there are about seven updates to install the first time you access Windows Update. There are other less-crucial updates down the page, including picks of the month, recommended updates, additional Windows features, fun and games, and preview versions. Every update is clearly labelled and specifies whether it is new or updated, and the recommended user level.

You can check which updates you want to install and then download them all at once. The download process is not perfect; when I was downloading and installing more than 10M of updates, a number of them were unsuccessful. This meant I had to repeat the process for those items that did not install successfully the first time.

Deciding which updates to download and install is entirely up to you. Installing most, if not all, of the critical updates is Displays of excellence...

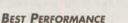


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advised. The most important of these are related to the security of Internet Explorer. There is the Outlook Express 'File Attachment' Security Update, the Internet Explorer Window.External.Jscript Security Update, the 'Dotless IP Address' Security Update, and the Internet Explorer 'Frame Spoof' Security Fix, which all prevent unauthorised Internet users accessing your computer.

It may be reassuring to install a couple of year 2000 bug fixes. The update for the Microsoft Virtual Machine basically corrects a minor problem associated with generating dates on your computer on or after January 1, 2000. The Windows 98 Year 2000 Update corrects things such as the entering of expiration dates in Microsoft Wallet, handling of some date and time settings, and incorrect logging of online calling.

Version 1.01 of the Microsoft Critical Update Notification is not a crucial update, but if you haven't already got it installed then now is a good time. The notifier basically lets you know when updates such as the ones looked at above are made available.

There are a few other updates which I highly recommend. The Internet Explorer Sound Pack will not increase loading, as it installs the fonts that many Web designers use in their pages. This updated version also includes the symbols for the new euro currency. Finally, if you like to keep your computer looking attractive, Windows Update has a number of new themes available for download.

You may be tempted to install the Internet Explorer 5 beta, but it is probably better to avoid doing so until the proper finished version is released. If you have a second non-critical computer, then you may want to install IE5 on it.

For those who want to experience the thrill of installing Microsoft's latest attempt at the perfect browser, then you can install it through Windows Update, or you can save time and use the copy on this month's **apcmag.cd**.

The Product Updates section has one more useful feature. If you click on the Device Drivers option on the menu, your computer will be scanned and after a few minutes, Windows Update will tell you if you need to install any new device drivers. I am not sure if this feature is 100% effec-

tive, but if it finds any new device drivers then you may as well install them.

We won't look at the support section of Windows Update in too much detail, but it is worth a mention. If you ever have a problem or query regarding Windows 98 you can gain access to numerous support options from this section of the site. There

are answers to frequently asked questions (FAQs), a listing of 'known issues' as well as links to online technical support.

For all you IT managers out there dreading the thought of having inexperienced employees clicking on the Windows Update button and messing with things they shouldn't, you can now breathe easy. You can remove the Windows Update option from the Start menu with a new entry to the Registry. Type REGEDIT in the Run dialog box, then create the following key: HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer (when you find the Policies key simply right-click and create the Explorer key).

Within the Explorer key you must create a DWORD value, titled NoWindowsUpdate, then right-click and give it a value of '1'. The Windows Update will not appear on the Start menu and Windows Update will not be accessible at all until the value of that DWORD is set to '0'.



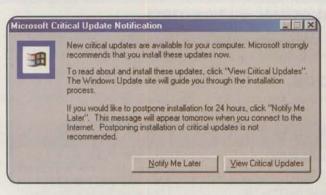
Other updates

No system is complete with an operating system alone, and the most common application you will find on most systems is Microsoft Office 97. Once again, this is an incomplete program and there are not one but two 'service releases' to fix up those bugs. You will find them on **apc-mag.cd**. You may also want to install Word 97 Template Security patch found on the CD.

The first service release is designed primarily for large organisations to address migration issues, making it easier to manage potential problems encountered when sharing files between different program versions. The second service release has many bug fixes that may or may not be useful to you. One supposed 'fix' is the overwriting function enabled by the Insert key. I preferred it when you could accidentally hit the Insert key without fearing that everything you type would overwrite the existing text. You need to install the first service release before you can install the second one.

The Word 97 Template Security Patch addresses a vulnerability that would allow malicious code to be run in a Word 97 document without warning the user. Word 97 does warn users if a document contains a macro, but if a document contains a link to a template with macros, Word does not give a warning unless this patch is installed.

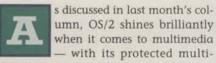
Many of you will probably remember Microsoft's TweakUI utility for Windows 95. If you haven't already installed TweakUI from your Windows 98 CD-ROM then you can do it now (you'll find it in the tools\reskit\powertoy folder). The customisation features provided by this utility are the icing on the cake for a complete and up-to-date Windows 98 installation.



the speed of your Internet connection, but it will provide a more pleasurable surfing experience by playing confirmation sounds every time you click on a link. If you play games and have yet to install DirectX 6 then add it to your download list. Windows Media Player is perfect for playing all types of media files. Version 6.0, which you can download through Windows Update, upgrades the previous versions of Media Player, NetShow and ActiveMovie and plays most multimedia content formats including Windows Media, RealAudio/RealVideo 4.0, QuickTime, AVI, WAV, MP3 and more. The Additional Web Fonts package is also worth downWhat do MMPM/2 and the bundled multimedia applications have to offer?

By Christopher Relf

OS/2 Warp



threading, pre-emptive multitasking, and high-performance file system, OS/2 is the perfect choice. So let's look at how we can use this powerful multimedia system to our advantage.

The Multimedia Presentation Manager (MMPM) is a very useful combination that was first released with OS/2 Version 2.1. It is generally supposed to work on three levels: device drivers, multimedia subsystems and MMPM/2 applications. Let's have a look at each of these in turn.

Device drivers These are the actual code that talks to your hardware: soundcards, video cards, and so forth. These drivers are not only available for multimedia hardware, but are also required for programs to access other devices, including printers, and tape and CD-ROM drives. For more information on obtaining device drivers and how to use them, refer to last month's OS/2 column (APC March, page 140) where we covered a very useful Webbased resource called DDPak Online.

Multimedia subsystems There are three main subsystems pertaining to multimedia: the MMIO (multimedia I/O interface) allows the MMPM/2 applications to manage multimedia files without really having to understand their formats completely; the MCI (media control interface) makes it possible for you to access multimedia hardware using your own programs written in languages like C++, LabVIEW, and REXX; and the SSM (the sync-stream manager) which, as its name implies, controls the synchronisation of all types of multimedia, such as audio, video and captioning, and ensures that all of these play at the right speed relative to each other. Confused yet? Don't give up, it gets much simpler from here.

MMPM/2 applications These are the programs that you see (or hear) actually doing something. The video player bundled with OS/2 is a great example you interact with it, it talks to the OS, other software and the hardware. You don't notice all of this happening, you just play with the MMPM/2 application. You will probably spend most of your time with MMPM/2 applications, so let's have a look at the ones provided free of charge when you install OS/2 Version 4.

Free MMPM/2 applications

The Volume Control This is the simplest application. It provides you with ultimate control over the output of the OS/2 sound mixer. It's just like the volume control on a sound system's amplifier and it looks the same too, just a circular con-

The CDP (Compact Disc Player) This is one of the easiest MMPM/2 applications to use, and it's also useful to make sure your CD-ROM drive is correctly connected and in working order. It looks quite similar to the control panel of a standard music CD player: the normal controls (play, stop, skip, shuttle and eject) are there, and you can also select a track instantaneously, adjust the CD player volume control locally, and view track and time information.



The DAP (Digital Audio Player) While on the subject of sound, let's take a quick look at the Digital Audio Player. In conjunction with your soundcard, it lets you record, play back and even edit digital sound files (called wave files, as they represent the waveforms of the sound). Much like the Compact Disc Player, the controls on the Digital Audio Player are what you would expect them to be: play, stop, record, and so on (although there are several more options available).

Although there isn't much to see on first inspection of the Digital Audio Player, there is a very powerful audio editing application tied to it. If you choose View, Editor, the waveform-editing window appears, including a comprehensive amplitude-against-time plot. You can play with the Zoom slider to compress and stretch the waveform graph within this window, and even more editing and selection information is displayed. The main controls are also mirrored here for easy use. Some of the things that you can do using the Digital Audio Player in Edit mode are:

Increase volume by 25% * Decrease volume by 25% * Maximise volume Double Speed * Half Speed * Fade In Fade Out Add Reverb * Reverse Add Echo * Mix from File

The commands marked with an asterisk (*) are recursive - you can apply them to a sample more than once. For example, if you wanted to speed the file up fourfold, you just select Double Speed twice. Similarly, if you wanted to add an immense amount of echo to your wave file (for that really spooky effect), then just keep on adding echo until you get your desired result (or the sound becomes totally unintelligible, whichever comes

Mix from the Clipboard



The DVP (Digital Video Player)

Using Software Motion Video is as simple as its audio counterpart — the controls are set logically and intuitively. IBM's Software Motion Video means that you don't really need to apply any image or audio compression to play smaller windowed video on higher-end processors.

You can play AVI (Audio-Visual Interleaving) files using the DVP, and although AVI files are not as popular as QT (QuickTime) files, there are still a few out there. 'The Hunt for Red October' and 'Blazing Saddles' haven't been released in this format yet, but it is still quite useful. As you might expect, there aren't any editing features available with DVP, so you'll need a third-party application to do that (see the AVI File utility below).

The MVDP (MIDI and Video Disc Player) Much like its counterpart in Windows 95/98 Media Player, the MVDP can play MIDI (Musical Instrument Digital Interface) files and Video Discs. MIDI files contain only data about what to play, and when (and possibly, depending on the MIDI version, how to play it, with parameters such as tempo, dynamics, breath control, after touch and portamento) rather than the ever-popular MOD format, which also contains the instruments. This makes MIDI files sound different depending on your soundcard, but MOD files are much bigger. A great third-party MOD player is UltiMOD, available from most OS/2 download sites.

The Multimedia Data Converter (MDC) This is an almost-useful utility included with OS/2 Warp. The idea behind it is great, but the execution lacks enough substance and support to be useful. You can convert your audio and image files to a limited number of other formats. For example, you can convert OS/2 bitmap files to a format viewable on an IBM M-Motion adapter (not that many people have one these days!).

The MDC uses RIFF (Resource Interchange File Format). This is the bit that's a good idea — it's a standard format used by many different types of multimedia files. The advantage of using RIFF is that, when converting a RIFF-compliant file into another file format, the RIFF interpreter can convert the parts (called chunks) of the file that it understands, and ignore the bits it doesn't. A close parallel is HTML (Hypertext Markup Language), where, if the Web browser (for example IBM Web Explorer) understands a tag (like the RIFF chunk) it is displayed in the Web pages, but tags that are foreign are ignored. Also



similar to HTML, RIFF can be updated when new chunk definitions are introduced

The AVI File Utility If you included the Video In component when you first installed OS/2 (admit it, you probably didn't because you thought it meant you needed a video capture card), then you have a neat little tool called the AVI File Utility somewhere on your hard drive. If you're at all serious about video and OS/2, you'll find that it can do some great things. For example, you can divide the video and audio tracks in an AVI file, view the RIFF chunks and their structure, add and delete RIFF chunks and even (this is my favourite bit) create an AVI from still frames (bitmaps or still video images).

I won't go into more detail on the AVI File Utility here, but there is a lot of information to be found in its online help.

Embedded multimedia enhancements

Like most other high-level operating systems, OS/2 Warp has several useful lines of code written into its core to assist the user in manipulating multimedia files. One such enhancement, although not particularly surprising these days, is the ability to immediately launch a multimedia file by double-clicking its icon on the desktop. The way OS/2 achieves this is different to other operating systems in



that for all of the file formats that are supported by OS/2's core, the file is immediately played by the core itself. No multimedia applications are launched, thus extra processing power is not required (sounds typical of the OS/2 developers!).

Another enhancement is called the Light Table. It looks much like a normal file browser window, except that visual image multimedia is represented using a large icon that looks strangely like a slide, and that's exactly the idea. Images (such as bitmaps and IPEGs) are shown in 'thumbnail' format in these cute little slide borders, so you can see each image in a smaller format before loading them all into your image editor. This makes organising your images a breeze, as you don't have to rely on the names that you've given your pictures. You'll definitely enjoy Light Table if you've got a digital camera that generates imaginative names such as IMG00001.BMP, IMG00002.BMP and so on for the photos you take. One problem



with Light Table is that viewing a file list can often take a much longer than a simple list of filenames.

Third-party multimedia applications

This month, you'll find some of the best third-party multimedia applications in the OS/2 Shareware section of apcmag.cd, because you can't possibly do everything that you want using the applications bundled with OS/2 Warp. I have collected what I consider to be the best multimedia programs in several categories for your multimediatic pleasure enjoy!

Comments on what you see in OS/2 Workshop — or what you would like to can be emailed to Christopher.Relf@ tip.csiro.au.

Scripting with Mac OS 8.5 — a look at AppleScript's most interesting new features. By Stephen Withers

Mac OS

ne of the big changes in Mac OS 8.5 was the improvements made to AppleScript. Apart from the speed increases that come from native PowerPC code, Apple has made more system components scriptable, added new commands, and tidied up some of the existing dictionaries.

The user documentation has improved too: select AppleScript Help from the Help menu when you're in the Script Editor, and you'll see what I mean. Note that updated versions of these help files are available from http://www.apple.com/applescript/ updates/updates.html - appropriately, the package's installer is itself an Apple-Script. (This Web page also contains a link to the Mac OS 8.5.1 updater that, among other things, corrects an AppleScript mem-

Apple is also renovating its online scripting overview at http://www.apple.com/ applescript/overview/, but at the time of writing, the coverage was very patchy. It looks like it'll be worth returning to over

For now here's a guide to what I think are AppleScript's most interesting and useful new features.

Sherlock's summarizer

Although Sherlock has received plenty of attention for its ability to access multiple Internet search engines in search of relevant material, another feature has gone largely ignored.

Using a technology first demonstrated by Apple several years ago, Sherlock is capable of summarising a passage of text into a specified number of sentences. If you've installed Microsoft Internet Explorer 4.5, you may have tried this feature, as it is one of the choices on the Sherlock pop-up menu (on the Address toolbar).

The results of the summarizer are sometimes surprising. It's supposed to work well on texts that resemble newspaper stories, but I found this isn't always true. On the other hand, I asked for a summary of the lyrics of the Smokey Robinson and the Miracles' 'Shop Around', and the result was a passage that represented the message of the song very well.



Anyway, one of the easiest ways to use the summarizer with programs that don't support it directly is to create an Apple-Script that summarises the contents of the clipboard, and then place the result back onto the clipboard. The OSA Menu extension can then be used to make the script accessible from any application, or you could add it to the Script menu of programs (such as Emailer) which make such

The command for summarising can be found in Standard Additions in the Scripting Additions folder. Its syntax is:

summarize anything [in integer]

where 'anything' is a string, an alias, or file specification of a text file, and 'integer' is the length of the summary in sentences. The result of the operation is a string.

Fortunately, the version of AppleScript in Mac OS 8.5 also provides ways of getting and setting the contents of the clipboard, so third-party additions are no longer needed for this purpose.

The script is therefore:

set text_to_sum to the clipboard set the clipboard to (summarize text_to_sum in 1)

Another way of using the summarizer is to create a droplet that summarises the contents of a text file that's dropped onto it.

First, we need some code to handle the drag-and-drop operation, filtering out the wrong file type. Once the summary has been created, we'll leave it on the clipboard, though you might want to write it to a new file with a name based on that of the source, or append it to the original file.

Either of the latter approaches would allow the script's extension so that it could process multiple files dropped onto it.

I doubt that the following script (named Summarize in the Workshop section of apcmag.cd) is bulletproof, but it is a starting point if you want to experiment further:

on open file_list

set the_file to item 1 of file_list set file_info to info for the_file if file_info's file type = "TEXT" then set the clipboard to (summarize the file in 1)

display dialog "Not a text file" end if

end open

Another useful variation would be to allow the user to specify the length of the summary. AppleScript now has a choose from list command, as in:

set how_many to (choose from list {"1", "2", "3") with prompt "How many sentences?" without multiple selections allowed) as integer

Adding that statement after the line that tests for a text file and replacing the constant "1" in the summarize statement to how_many should do the trick.

One final point on Sherlock is that Internet searches can be scripted, including the selection of plug-ins to be used. The basic syntax is:

search Internet [string1] for string2

where string1 is an optional list of sites to be searched and string2 is the text which Sherlock should look for. The 'for' clause can be replaced with a 'using' clause that specifies a saved Find file containing the required query. The result of search Internet is a list of matching URLs. Items from this list can then be passed one at a time to a Web browser for retrieval. Although Standard Additions provides the open location command for this purpose (directing the request to the appropriate application as specified in the Internet control panel), this is likely to cause the

pages to be sequentially retrieved into the same window, so you only get to see the last on the list. Depending on the browser you are using, it may be possible to open a new window for each URL. This is how to do it with Microsoft Internet Explorer 4.5:

tell application "Sherlock"

set url list to search Internet "apc mag.com" for "Sherlock" quit

end tell

tell application "Internet Explorer 4.5"

Activate

repeat with i from 1 to count of url_list OpenURL (item i of url_list) as string toWindow 0 end repeat

end tell

(See Sherlock Retrieval on apcmag.cd.)

Doubling up

Although the Appearance control panel lets you move the scroll arrows to the lower or right-hand ends of the scroll bars, Mac OS 8.5 also allows both arrows to appear at each end. While this feature can be activated in the Prestissimo control panel (http://www.polymorph.net/), it can also be controlled from an Apple-

If you rely on Appearance's dictionary, you'll think the options are either:

set scroll bar arrow style to single

set scroll bar arrow style to both at one end

However, if you use Prestissimo to set the arrows to "both at both ends", and then use AppleScript to read the value of scrollbar arrow style, you'll find that it is «constant ****dubl».

So the script:

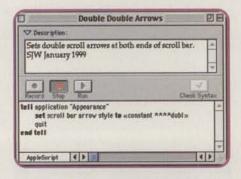
tell application "Appearance"

set scroll bar arrow style to «constant ****dubl» quit

end tell

gives you double-ended double arrows (see Double Double Arrows on apcmag.cd).

Many other items controlled by Appearance can be changed with a script, so there's plenty of scope for fun and games, such as selecting a theme or desktop picture according to the day of the week or even the time of day.



Folder automation

Mac OS 8.5 can automatically trigger scripts when a folder is opened or closed, when items are added to or removed from an open folder, or when an open folder is moved or resized.

Apple is promoting this feature in relation to workflow automation, but it can be used just to help keep things tidy. Maybe when you close a particular folder, you always want to close the folders it contains as well. The following script (Close Test 1 on apcmag.cd, but it's basically the same as the standard script called "close - close sub-folders" in the Folder Action Scripts folder in a normal Mac OS 8.5 installation) does the trick:

on closing folder window for this_folder tell application "Finder" activate close every folder of folder this folder

end tell end closing folder window for

However, it's not recursive - every folder only refers to those folders immediately within the current one. While the entire contents digs through the hierarchy, it leaves you with the task of filtering out the subfolders from the documents and other files. The simplest way I found to do this is to look at the last character of each item in the list; if it ends with a colon, it's a folder. This version is called Close Test 2 on apcmag.cd.

on closing folder window for this folder

tell application "Finder" activate set folder list to the entire contents of folder this_folder repeat with I from 1 to count of folder_list set this_thing to (item i of f older_list) as string if last character of this_thing = ":" then

close folder this_thing end if end repeat end tell end closing folder window for

You might like to modify this script so that all the subsidiary folders open automatically when the folder associated with the script is opened.

To ensure a folder's window always opens at the top left-hand corner of the desktop, you could use a script like this:

on opening folder this_folder tell application "Finder" copy the bounds of the container window of folder this_folder to (I, t, r, b) set r to r - I + 6 set b to b - t + 42 set | to 6 set t to 42 set the bounds of the container window of folder this_folder to {I, t, r, b) end tell end opening folder

Note the somewhat verbose approach needed to get at the bounds (top-left and bottom-right coordinates) of the window.

Although it's unrelated to folder actions (or Mac OS 8.5-specific scripting), it strikes me that a droplet script which combines this method of adjusting window position and size with the folder-scanning routine in the previous script could be useful. It could be written to stack nested windows neatly, or to ensure that the folder's window — and those of its subfolders - fit completely within your screen's boundaries.

PPP and Remote Access

As Mac OS 8.5 users will have already found, the old Open Transport/PPP functionality has been wrapped into the Remote Access control panel. Similarly, the scripting commands for both PPP and Remote Access are found together in Remote Access Commands (within Scripting Additions). As far as I can see, the commands are unchanged, but if you're trying to add sophistication to a script, you'll need to know where to look for the dictionary.

Apart from that, the only change seems to be an extra property in PPPStatusParam. The protocol property indicates whether PPP, ARAP or an unknown protocol was negotiated for the current session.

Linux will give you more than the time of day, if you ask correctly.

By Geoffrey Bennett

Linux

clock consistently displaying the wrong time can be infuriating, but Linux offers several options to set the hour of the

day. First we'll look at the two clocks in your computer and how to set them, and then go through a few of the common programs relating to time.

All modern PCs have battery-backed clocks on their motherboards that keep track of the current date and time, regardless of whether the PC is plugged in or not. This clock is known by many different names, including 'hardware clock', 'CMOS clock', and 'real time clock' (or 'RTC').

When Linux boots, the hardware clock is used to set Linux's own clock, called the 'system clock'. Once the system clock is set, the hardware clock is ignored until the next time you boot.

With DOS and Windows, the hardware clock is usually set to the local time, but if you only run Linux on your computer, it is possible to set the hardware clock to UTC (also known as Greenwich Mean Time or GMT) and have Linux automatically calculate the correct local time based on your time zone. This even takes into account daylight saving, so you'll have one less electronic device to change the time on twice a year. You could of course keep the hardware clock in UTC even if you were running DOS or Windows, but the time would then always be incorrect in that OS.

Setting the time

Linux provides two utilities to set the timepieces in your computer; 'date' is used for the system clock, and 'hwclock' is used for the hardware clock. To set the system clock to 11pm on March 1, you would type:

date 03012300

The first two digits are the month, the second two are the day, and the last four are the time in 24-hour notation. If you need to set the year as well, just put it on the end (030123001999). Of course, you need to be

logged in as root to change the current time.

The easiest way to set the hardware clock is to set it to the current system time. To do this, type:

hwclock --hctosys

If you want to keep the time in UTC, you need to specify the --utc option on the command line, and if you haven't already done so, you'll also need to tell Linux that the hardware clock is now in UTC. This is usually done by editing a configuration file such as /etc/sysconfig/clock.

As you may have noticed, the hardware clock in most PCs often runs slow or fast. The --adjust option to hwclock can automatically compensate for this error if it is consistently wrong; instructions on setting it up are available in the man page for hwclock.

Setting the time from another networked computer

The xntpd and rdate programs let you synchronise the time on your computer with that of another computer on a connected network. If you have a network of computers permanently connected to the Internet, you can run xntpd in the background, and it will keep the time on your computers to within milliseconds of the correct time. If your need for time precision is more modest and you only have a dial-up connection, you can use rdate to query a remote time server and set your clock.

Time zones

The symbolic link /etc/localtime is used to tell Linux which time zone you are in. This link should point to the appropriate time zone file in the /usr/share/zoneinfo directory (such as Australia/Sydney). Most distributions provide a utility (such as timeconfig or tzconfig) to present you with the list of time zones and set the link for you. Another advantage of storing your hardware clock in UTC is that you can move your computer to a different time zone, tell Linux where you are now, and not have to reset the time (this feature is probably more handy for someone who flies a lot with their laptop than someone with a desktop).

An expensive watch

If you ever happen lose your watch (but have a computer running Linux handy), you can run the date command with no options to find out the current date and time. You simply type date and the computer gives in the current date and time in the following format:

Mon Nov 16 21:30:00 CST 1998

Regardless of what time zone you are in and whether your hardware clock is set to UTC or local time, Linux's internal clock runs on UTC and it counts the number of seconds since midnight January 1, 1970 (for example, 911214060 for 9:30pm November 16, 1998) to calculate the date and time. Even the last modification dates of files are stored in this way.

One advantage of this is that people working remotely on a Linux computer (perhaps across the Internet) can tell Linux which time zone they are in, and all the times displayed to them will be adjusted for that time zone. This can be done by setting the 'TZ' environment variable. If you type export TZ=Australia/Adelaide and then type date, the computer returns the current time in Adelaide:

Fri Jan 15 11:57:10 CST 1999

You can compare this with other time zones in Australia by typing export TZ=Australia/Perth followed by date. The computer then returns the current time in Perth:

Fri Jan 15 09:27:22 WST 1999

You can also use this feature to find out the time in other parts of the world. For example, if you typed TZ=Europe/Paris date the computer would return the current time and date in Paris:

Fri Jan 15 03:27:35 EET 1999

Running out of time?

Since Linux stores time as the number of seconds since the beginning of 1970, it has no inherent year 2000 problem. For 32-bit architectures such as the Intel and compatible processors, however, the time is stored as a signed 32-bit number, which can have values ranging from approximately -2 billion to +2 billion. This number will overflow sometime in the year 2038, when the time will 'wrap around' to the early 1900s. Perhaps by 2038 we will all be using 64-bit architecture computers; by using 64 bits to store times, we can keep track of time for a few hundreds of thousands of millions of years.

Calendar

The cal program can be used to display the calendar for any month of any year. If you don't choose any options, it displays the calendar for the current month. If you type cal 1999, the calendar for the year 1999 will be displayed, and cal 1 1999 will display the calendar for the first month of 1999. Just don't make the mistake of typing cal 98 — this will display the calendar for the 98 AD, not 1998 AD,

```
-OX
% cal 1 1999
January 1999
Su Mo Tu We Th Fr Sa
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
```

Timing programs

Although you might think the 'time' command is used to find out the time, it is actually used for timing programs. If you want to know how long a program takes to run. you can type time program instead of just program, and when the program finishes running, some timing statistics will be printed:

```
% time Is -laR
Is -laR 0.61s user 1.35s system 40% cpu
4.894 total
```

The last number is how many seconds the program took to execute. The other numbers say how much CPU time was used by the program ('user'), by the operating system on behalf of the program ('system'), and percentage CPU time used while executing.

Scheduling

The cron and at commands let you run programs at some later time or date. The difference between the two is that cron is used to run programs at regular intervals (such as '6pm every Sunday', or 'every 15 minutes'), and at is used when you want to run a program just once at a specified time (such as 'tomorrow at 1:30am').

The at command

To create an at job, you type at followed by when you want the job to be run. You can then type one or more commands that you want executed, followed by Ctrl-D. Here are a few examples.

You can use your computer as an expensive alarm clock by getting it to start playing a music CD (track 4) at 7am. Type:

% at 7am at> cdplay play 4 at> ^D

You can send yourself a reminder email in three days time by typing:

% at now + 3 days at> echo "Don't forget to get Bob's birthday present." I mail -s "reminder" geoffrey

If you want to download a large file later on when you're not around, type:

% at midnight at> wget ftp://ftp.aarnet.edu.au/ls-IR.gz at> ^D

As you can see from the examples, there are a variety of ways to specify when you want a job to be executed. For more information on the sorts of time specifications you can use, see the at man page.

Since you may or may not still be logged in when your 'at' job is run, the system will email to you any output produced by the commands that are run instead of displaying it on your terminal.

Each job that you submit gets assigned an ID number which you can use later to cancel the job or show the commands that it will execute. If you forget the number, or want to check when a job is due to be executed, you can type atq. To remove job number 12, use atrm 12, or to display the commands that will be run, use at -c 12. When you display a job, you'll find that there are a number of extra commands that are run before yours; these commands set up the job so

that it runs in an environment as similar as possible to the environment where you started the job.

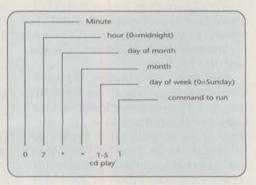
The Cron command

The Cron program is responsible for executing commands on a regular basis. For example, at can be used to wake you up tomorrow morning, but if you wanted to be woken up every morning Monday through to Friday at 7am, then you should use the cron program.

The list of cron jobs you want executed are stored in a crontab file; to create or edit this file you can type crontab -e. Each line in this file specifies a particular cron job to be run. To implement the alarm clock mentioned above, you would need to enter:

0 7 * * 1-5 cdplay play 1

You can consider the line to be broken up into six fields as illustrated in the figure below.



An asterisk is a wildcard (in effect, 'doesn't matter'), so the cdplay play 1 command will be run all year round. For more information on the specification, see the crontab(5) man page (type man 5 crontab).

If you want to run more than one command, it will most likely be tidier if you write a shell script to do what you want, then run the shell script from your crontab file.

Other uses for cron include automating backups; checking for free disk space and emailing you if you're getting low; downloading the latest weather map to use as wallpaper; regularly removing backup files, or compressing files that haven't been accessed for a long time; and automating the creation of Web page access statistics.

Further uses are only limited by your imagination! As with at jobs, if your cron job produces any output, the output will be mailed to you instead of displayed on a terminal =

Workshop

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PROGRAMMING

Putting variables to work. By Michael Smith

Simple C++

ast month you were introduced to functions and variables. Now you can put them to work, beginning with a short program that computes the circumference of a circle.

#include <iostream>

int main() double radius, circ; const double pi = 3.14159265;

// GET THE RADIUS std::cout << "Computing a circle's circumference.\n\n" std::cout << "Enter the radius:\n": std::cin >> radius;

// COMPUTE THE CIRCUMFERENCE circ = 2*pi*radius;

// OUTPUT THE RESULT std::cout << "The circumference is" << circ

return 0:

Just like last month's example, you include the iostream header that contains the definitions for stream I/O.

You begin the program by declaring some variables, in this case, two double precision floating point variables to hold the values of the radius and the circumference. You also declare a constant, pi. The generic term for the name of a variable or constant is 'Identifier' (see 'Identifiers' on the next page). When you use C, the declarations must be at the beginning of a block of code, but in C++ you can declare them anywhere in the block — although you can't use them until they have been declared. There is some debate about the best place to put declarations. Some people prefer to put all declarations at the top of a block of code, as shown in the example above. Other people prefer to put declarations close to the identifier's first occurrence. For short functions, where the whole function can fit on a single screen, I usually

declare all variables at the top. For longer functions, if a variable is used in a small area of the function, I'll declare it close to that area. If it is used in several places, I usually declare it at the top. If you want a simple rule, I would suggest that you generally declare all constants at the top.

The first action of the program is to output some text using the std::cout stream, which was discussed last month. Then you read in the radius using std::cin. The std::cout stream is an output stream, and std::cin is an input stream. Like output streams, input streams are fairly complex. For now, let's leave them in the 'trust me, it works' category.

You now compute the circumference and output the results using std::cout. Finally you return zero.

Functions

To date, both of the example programs have used just one function: main(). This is OK for trivial programs, but most useful programs are much too complex to contain all of the logic in one function. In general, a program will contain multiple functions. The main() function will call one or more other functions, which in turn call other functions, and so on. It is considered good design to create a function for each task, so that each function performs only one task.

Let's try a slightly more complex example which uses two functions.

#include <iostream>

// CUBE FUNCTION int cube(int val) return val*val*val; int main() int i=5: double d=3.7;

Avoiding a common problem

In last month's column, I wrote "The main() function must always return an integer". After I submitted the column, one of the technical editors (who shall remain nameless) suggested that I had made a mistake. He might well be excused for thinking that, as some of the best-selling C and C++ texts recommend declaring the main function as 'void main()', to avoid the need to put a return statement at the end. This is quite unfortunate, as it is wrong. The C and C++ language standards clearly state that main should return an int.

Why is it a problem?

There is the obvious danger that the program will then return a (more or less random) value that the operating system might misinterpret as an error and do something undesirable with. But it could get worse.

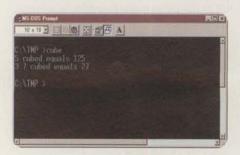
On a stack-based system like Windows, the operating system may expect to find the return value on the system stack. If the compiler does not push something onto the stack, then the operating system might try to pop a nonexistent value from the stack, possibly corrupting the stack in the process. Can you spell GPF?

Now a lot of modern compilers are smarter than that. They will usually detect the bad main() declaration and clean up properly. But there is a risk that one day you will port your code to a compiler that is not quite smart enough. It's not hard to put a simple 'return 0;' at the end, so I suggest that you play it safe.

```
// COMPUTE SOME CUBES
 std::cout << i << " cubed equals " << cube(i)
  std::cout << d << " cubed equals " <<
cube(d) << "\n";
 return 0;
```

Here you define the function cube(). The function expects one integer argument (val), and returns an integer. In the main() function you call cube(i). The cube() function is executed, with the parameter val set to the same value as i (5). It all works quite well.

Or does it? cube(i) works fine, but cube(d) is less useful. The double value, d. gets truncated to an integer and you com-



pute 31 instead of 3.73. What you need here is another version of cube() which works for doubles.

```
double cube( double val )
 return val*val*val;
```

In C you can't have more than one function with the same name, but in C++ you can — as long as the argument type is different. If you call cube() with an integer argument, the compiler will call the integer version of cube(). If you call it with a double argument, the compiler will select the double version of cube(). You could also create other versions of cube() for other data types such as short or float. In this case it is not really necessary. If you call cube() with a short argument, the integer version will be executed and a float argument will invoke the double ver-



sion. Having multiple functions with the same name is called 'function overloading'. Remember that name, because you'll hear it a lot more before this series is finished.

References

Sometimes you may want a function to change the value of an argument which was passed to it. For example, the following program attempts to compute half of a given value.

```
#include <iostream>
// HALVE FUNCTION
double halve( double val )
 val = val / 2:
 return val;
int main()
 double d=10;
 // COMPUTE HALF
 std::cout << " Half of " << d << " equals ";
 halve(d);
 std::cout << d << "\n";
 return 0:
```

Now this may look OK, but when you run the program you get the output Half of 10 equals 10. Something is obviously fishy. C++ functions use the 'call by value' convention for passing arguments. This means that when a function is called in C++, the function gets a copy of each of its arguments. In this case, the copy of d gets halved, but that has no effect on d in the main() function. The alternative is the 'call by reference' convention, where the actual argument gets passed to the function. C++ also supports call by reference using a slightly different syntax. If you change the halve() function slightly you get this:

```
double halve( double& val )
 val = val / 2:
 return val;
```

By declaring val to be of type double& instead of double you declare val to be a reference parameter. Now every change to val in halve() performs the same change on d in our main() function.

You now get somewhat more satisfying output Half of 10 equals 5.

Another type: void

The data type void is a Claytons type: the type you have when you're not having a type. Our halve() function is returning a value, but it's not being used. This is a little wasteful. A better idea would be to declare halve() as a function which returns void - in other words, it returns nothing.

```
void halve( double& val )
 val = val / 2;
```

What could be simplier?

Next month we'll look at operators and arrays and lots of other neat stuff.

Identifiers

An identifier (name) consists of a series of letters, digits and underscores ('_'). The first character must be a letter or an underscore. This is followed by zero or more letters, numbers and underscores. Some compilers allow other characters, such as a dollar sign, but using such characters leads to non-portable code. This is usually a bad idea.

The compiler reserves certain words, such as int and return. These words must not be used as identifiers, but beyond that it's fair game.

Some valid identifiers include:

```
XX
       c001
                     foo_bar
                                 WordCounter really_long_identifier_name
```

Some invalid names include:

```
2110
                       (Begins with a digit)
Word Counter
                       (Contains a space)
                       (Contains the invalid character '~')
foo-bar
                       (This is a reserved word)
```

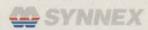
The case of letters is important. X is a different identifier to x. Also, class is a reserved word, but CLASS, Class and clAss are not. The C++ standard does not limit the length of an identifier. Some compilers do impose limits, but they are usually reasonably long.



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Refining the Java client and server programs presented last month, and adding a server written in C. By David Williams

Java

ast month we covered the theory and background of client/server programming. We finished with Java client and server programs, which you should have been able to compile and run. How the programs actually worked may not have been so clear. This month, we take a closer look at the classes Java provides for network communication, and then we'll enhance the programs.

Java provides several classes to facilitate socket programming. The main class is java.net.SocketImpl, which is an abstract class. It provides the socket operation policies but must be subclassed to provide an actual implementation. The two classes that will be used in practice are java.net.ServerSocket, which encapsulates a server socket, and java.net.Socket, which implements a client socket. Conceivably, the SocketImpl class can be changed to allow different underlying implementation policies, but this is not a common practice. The constructors and key methods of the two classes are shown in tables 1 and 2 respectively. Table 3 lists the key methods for a useful class, java.net.InetAd-

Table 1: java.net.ServerSocket constructor and key methods

ServerSocket (int port [, int time])

The sole constructor for a server socket, which binds the socket to the specified port. Optionally, the amount of time to listen for a connection can be specified.

Socket accept ()

Returns a connection on a new socket.

Void close ()

Closes the connection.

InetAddress getInetAddress ()

Returns the address to which the socket is connected.

int getLocalPort () Returns the port to which the socket is connected.

String toString () Returns a String showing the socket's address and port.

Note: The constructor and the accept and close methods throw an IOException if an I/O error occurs:

dress (which has no constructors), that can be used to encapsulate IP addresses.

Armed with this knowledge, the sample code we wrote last month might make more sense. In the server, a ServerSocket is defined in the same manner as any other Java variable, and a port number is given in its constructor (port 2000). The port number can be any integer value or variable. As mentioned, however, only values above 1,023 should be used for private

use. The server will sit and listen to the specified port, but cannot actually do anything. You must therefore use the accept call to block execution of the program until a client makes a request. At this point, the accept method will terminate, returning a java.net.Socket object. This Socket will be used in the same way java.net.Socket is used in a client, enabling network communication. The ServerSocket's main purpose is to wait for a connection and pass this to another socket for processing. Following the accept method, a DataInputStream is constructed and associated with the new socket. Its readLine method is then called and the returned string is displayed on the screen. Finally, both sockets are closed and the program terminated.

The client begins by creating a Socket object using the local host (the address is returned from a call to InetAddress .getLocalHost ()) and port 2000. The port numbers of the client and the server must match otherwise they won't be able to communicate. Note that the local host does not need to be used - the server and the client can be run on entirely separate machines. The program then proceeds to construct a PrintStream which is associated with the socket. Its println method is called to send a message to the server and the socket is then closed and the program terminated. If the output is buffered, you can use the flush method to force the completion of any latent writes.

This is a simple demonstration of

Table 2: java.net.Socket constructor and key methods

Socket (String hostname, int port Constructor to create a socket and connect it to the specified [, boolean isStream]) hostname and port. The socket will be a stream socket if isStream is absent or is true, otherwise will be a datagram. socket. An UnknownHostException is thrown if the host is not Socket (InetAddress address, int port Constructor to create a socket and connect it to the specified [, boolean isStream]) IP address and port. The socket will be a stream socket if isStream is absent or is true, and a datagram socket otherwise. synchronized void close () Closes the socket. InetAddress getInetAddress () Returns the address to which the socket is connected int getPort () Returns the port to which the socket is connected. InputStream getInputStream () Returns an input stream for the socket. OutputStream getOutputStream () Returns an output stream for the socket. String toString () Returns a String showing the socket's address and port. Note: The second constructor and the close, getInputStream and get OutputStream methods throw an IOException if an I/O error occurs.

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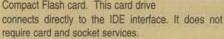
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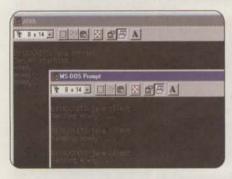
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WORKSHOP/APRIL 1999 PROGRAMMING



client/server programming, but it is not very useful in practice as the client and server don't greatly interact and the socket terminated after only one client message. The server usually returns information to the client (writing to the socket in the same way the client did) and the server normally runs continually, processing multiple client requests. It usually only terminates when the computer is shut down.

In fact, this is what makes servers more complex than clients. Many clients can be run either on the same machine in a multitasking environment or on many different machines, but there is only one server on a machine to process incoming requests. The server must therefore not only continue to run after it has processed requests, it must also deal with client requests concurrently. Java easily caters for this using threads. A more complicated multithreaded server program that is able to respond to many client requests simultaneously follows.

import java.net.ServerSocket; import java.net.Socket; import java.io.IOException; import java.io.DataInputStream; import java.lang.System;

```
class ServerThread extends Thread
  DataInputStream datain;
  Socket me:
    public ServerThread (Socket s) throws
IOException
   me = s
     datain = new DataInputStream (s.get-
InputStream ());
  public void run ()
   try
     System.out.println (datain.readLine ());
     me.close ():
    ) catch (IOException E) {};
public class server2
 public static void main (String args[]) throws
IOException
  ServerSocket s = new ServerSocket (2000);
  Socket sock:
  ServerThread handler:
  System.out.println ("Server starting ...");
  while (true)
   sock = s.accept ():
   handler = new ServerThread (sock);
    handler.start ():
```

The screenshot above shows the client has been run three times — each time the

server responds and continues to respond.

This new server, server2, creates a new thread to process each incoming request. Once accept has returned a Socket object, a ServerThread is created and its start method is invoked. The server continues to accept requests by running in a simple while loop. Although the internal design of the server has changed considerably, it still prints messages as before, and the very same client program can still be used. The ServerThread contains a constructor that initialises some variables, and a run () method, as required by any thread. The run () method, however, is trivial, simply displaying the message read from the socket. Nevertheless, the code shown at left is the beginning of what could become a very complex server if the run () method were replaced with something more substantial.

It is important to note that not only simple string messages can be transmitted. The input and output streams of the socket can be used like any other Java stream to transmit many and varied objects. The client and server can then interact by transmitting custom data structures. The server can process the client's request in some way and return a different object in response. The usefulness of sockets in a client/server environment is limited only by your imagination. As you begin to work with sockets, you will become more familiar with their use and things will become easier.

Note that the socket interface is common among many different TCP/IP environments. Last month I mentioned a C++ server that communicated with a Java client. Server.c, a C version for Unix developed in this article, can be found in the Workshop section of **apcmag.cd**—you'll notice how much more complicated it is than the Java version! This server will still only print a message, but the same Java client can be used to call it.

Client/server programming is a useful paradigm in computing. Coupled with the ease and advantages of Java, it is a powerful tool. Client/server programming is a useful method to begin migrating code to Java. It enables you to take advantage of the features of Java, while communicating with legacy code that may be in a different language or running on a separate part of the network. It also allows you to create distributed applications. If applications are well designed, the user will never be aware that they are accessing remote parts of the network. The possibilities are endless and the advantages many.

Table 3: java.net.InetAddress key methods

static synchronized InetAddress Returns an InetAddress object for the given hostname, expressed in the usual format (e.g. machine.domain.com).

static InetAddress getLocalHost () Returns an InetAddress object for the local host static synchronized InetAddress

getAllByName (String hostname) Returns an array of all InetAddress objects for the given hostname.

String getHostName () Returns the hostname for the InetAddress.

String toString () Returns a String with the corresponding IP address for the InetAddress.

Note: This class has no public constructor; the methods getByName (), getLocalHost () or getAllByName () must be used to

Note: This class has no public constructor; the methods getByName (), getLocalHost () or getAllByName () must be used to instantiate an object. These three methods all throw UnknownHostException if the address is unknown.

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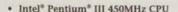
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Each month this page lists all the Shareware files that can be found on apcmag.cd. Simply browse to the Workshop section to find the files and related reviews.

Shareware summary

Windows

BiblePro 6.0

Bible study program with multiple translations, useful search and note-taking tools and many other features.

Virtual Rosary 3.5

Simple program to assist with learning or reciting the rosary. Includes English, Latin and Spanish texts.

Theophilos 2.6

Powerful Bible study program based on the King James version. It has numerous tools and can be expanded with a wide range of additional modules.

Prayer Times 4.0

Package to assist Muslims in their daily observances. determine precise times

and direction for prayers for any location.

Pagan Daybook II

A calendar/screensaver which displays observances for pre-Christian religious traditions of Western Europe.

Crucifixion Theme

This desktop theme emphasises the religious significance of Easter.

OS/2

Albatros Media Player 2.0b6

A fully functional multimedia suite. This multimedia (video and audio, but not stills) player will take just about any file format you can throw at it, and it's not heavy on the CPU either!

Embellish 2.01

Visual effects (fish-eye, oil painting, melting, swirl) and colour alteration (greyscale, gamma adjust, histogram) are available. Some filters are predefined, but you can also design your own.

MainActor 1.5

This one does just about everything! MainActor is a modular multimediaprocessing package that lets you load, edit, play, save and convert all major animation formats and the most common picture formats.

PMView 1.04

This robust general-purpose graphics viewing and manipulation utility has most of the standard manipulations available, including section transformation (mirror, rotate, sizing) and colour adjustment (conversion, gamma correction, brightness, contrast, RGB balance). Almost every file format ever conceived is supported.

QuickMotion 2.0

QuickMotion extends MMPM/2 to add QuickTime, QTVR (virtual reality), QT-MIDI (Musical Instrument Digital Interface), and Windows-style AVI movie support to OS/2. Included is QuickFlick, a native 32-bit OS/2 movie player and streaming video/audio

plug-in for Netscape Navigator.



Mac OS

Uli's Moose 2.0

The classic Talking Moose is revived and updated - still free, and as irreverent as ever. The Phrase Editor now accepts plain English, if you get tired of the more than 1,300 phrases supplied.

DeskBots 1.6

DeskBots is the Moose on steroids. It's more expensive than the Moose, but potentially more flexible. It has been updated to feature a family of robots, multiple personalities, background sounds, editable phrases, and AppleScript control.

Kineticon 1.4

Kineticon brings animated icons to your folders, applications and documents. An easy-to-use editor makes generating your own animations a breeze. System alerts and the Trash can also be animated. Shades of Oscar the Grouch!

MyEyes 2.3.2

Remember the Eyeballs INIT? Add colour, a library of eye styles, a 'blink and snooze' timer, and movable eyes, and you have MyEyes to follow your every move. Never lose that cursor again!

Yo 1.0

How about transforming your System alerts by randomly selecting from up to 1,000 sounds? Yo will allow you to do this, and to allocate each sound a priority and a volume level. Sounds can also be imported or recorded.

Kaleidoscope 2.1.1

Arguably the most popular appearance enhancement for the Finder, Kaleidoscope has been updated, and is now Mac OS 8.5.1 compatible.

Linux

Postilion

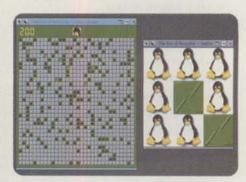
Fully featured GUI email client based on TkRat with a Mail.app look and feel. It supports virtual folders, which are useful for multiple incoming message sources.

Code Crusader

Free programming IDE with a slick graphical interface and an impressive source code editor. Integrates with Code Medic to provide a very capable development environment.

Ace of Penguins

Excellent games suite for Linux featuring popular titles such as Minesweeper and Solitaire.



Simple, generic LDAP client with a GTK interface. Useful for browsing LDAP servers and testing your own implementations.

Stamp is a cool utility for adding timestamp and title information to Webcam images from digital cameras or scanned photos.

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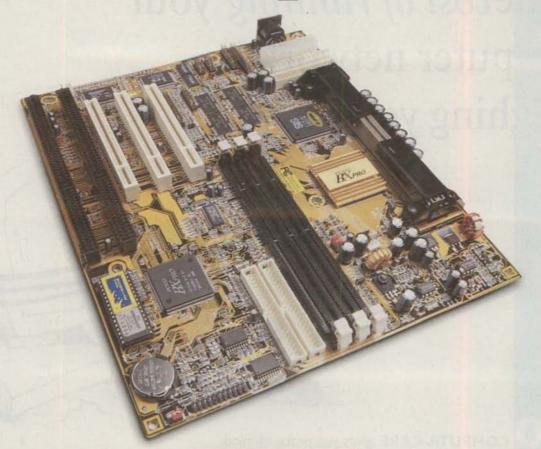
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Corel Draw 8.0 (Upgrade from 4.0) Corel Gallery Magic 1,000,000 Corel WordPerfect Suite 8.0 Upgrade Crystal Reports Pro 7.0	495 169 215 629	MS Office 97 Developer Upgrade MS Office 97 Small Business Upgrade	475 420	Quick Books 5.0 / Quick Payroll 4.0 Quick Books 5.0 Pro	379 337	ED Norton AntiVirus 5.0 GOLD ED Norton PC Anywhere 32 8.0 H&R ED Norton SystemWorks 1.1 ED Winfax Pro 9.0 Hardware/Peripherals Inc Tax	55 149 129 89 Ex Tax
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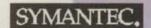
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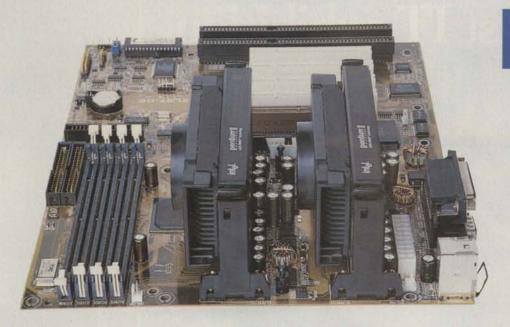


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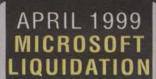


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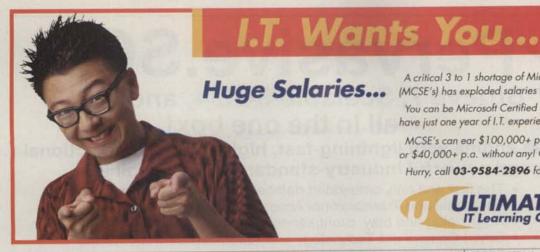
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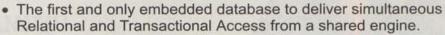


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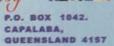
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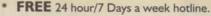
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PENTIUM II MB PC100 BX PRO WITH AGP V/S	172	MATROX MILLENIUM G200 SDRAM RMR AGP OFM	197
PENTIUM II MB GIGABYTE BXC AGP 100Mnz	221	G-SERIES RAINBOW RUNNER STUDIO CAPTURE	347
DENTHUM II MD ADIT BH-0 AGP TOUMITZ	225	G-SERIES DVD UPGRADE MODULE MATROX M3D GAMES CARD NEC VR2 4MB ASUS RIVER TNT AGP-V3400TNT 16MB ASUS RIVER TNT AGP-V3400TNT/TV 16MB	142
PENTILIM II MR FPOX 61-RYA AGP 100MH7	210	MATROX M3D GAMES CARD NEC VR2 4MB.	86
PPGA CONVERTER TO SLOT 1 MODULE	25	ASUS RIVER TNT AGP-V3400TNT 16MB	272
CPIES - PENTIUM II - PENTIUM III		ASUS RIVER TNT AGP-V3400TNT/TV 16MB MEMMORY FAM 4MB 30P - 128MB 168P 30 PIN 4 MEG SIMM STD 60NS 72 PIN 16 MEG SIMM STD 60NS 72 PIN 32 MEG SIDD SIMM 50/60NS 168 PIN SDRAM DIMM MODULE 64MB EPROM 168 PIN SDRAM DIMM MODULE 64MB 100MR2 168 PIN SDRAM DIMM MODULE 128MB 100MR2	297
CYRIX/IBM 686M2-266 CPU M2 - MMX CPU	82	MEMMORY RAM 4M8 30P - 128MB 168P	100
CYRIX/IBM 686M2-300 CPU M2 - MMX CPU	87	30 PIN 4 MEG SIMM STD 60NS	23
CYRIX/IBM 686M2-333 CPU M2 - MMX CPU	104	72 PIN 10 MEG SIMM STD 60NS	147
AMD K6 II P-300 3D CPU WITH MMX TECH	124	72 DIN 16 MEC COO CIMIN STUDING	C4
AMD K6 II P-350 3D CPU WITH MMX TECH	201	72 PIN 32 MEG EDO SIMM SO/SONS	125
AMD K6 II P-400 3D CPU WITH MMX TECH	316	168 PIN SDRAM DIMM MODULE 32MB TONS	78
DENTILIA MANY 222 COOVET 7 COLL LIMITED	210	168 PIN SDRAM DIMM MODULE 64MB EPROM	161
CELEBON 3334 Mts PPGA CPILINTEL IN BOY	165	168 PIN SDRAM DIMM MODULE 64MB 100Mhz	161
CELERON 366A Mhz PPGA CPU INTEL IN BOX	212	168 PIN SDRAM DIMM MODULE 128MB EPROM	326
CELERON 400A Mhz PPGA CPU INTEL IN BOX	302	168 PIN SDRAM DIMM MODULE 128MB 100Mhz	326
CELERON 333A Mhz MMX CPU INTEL IN BOX	167	KODAK DC CAMERA FLASH RAM 10MB	202
CELERON 366A Mftz MMX CPU INTEL IN BOX	239	MONITORS 14" - 21"	
CELERON 400A Mhz MMX CPU INTEL IN BOX	318	14" NON-INT MONITOR L/R STD	234
PENTIUM II 350Mhz MMX GPU INTEL IN BOX	463	15" NON-INT MONITOR MPHILLIP VAN	259
DENTITION II 400MIZ MMX CPU INTEL IN BUX	1 157	15" MITCHRISHI DV1570I DIGITAL MPRILMON	320
PENTITION II 450Mile MMY CPU INTEL IIV BOX	1 142	15" NON-INT MONITOR MPRILLIR MILLTIMEDIA	310
PENTIUM III 500Mhz MMX CPU INTEL	1 610	15" VIEWSONIC E655 DIGITAL MONITOR	348
HARD DISK DRIVES 3 2 GIG - 14 4 GIG		15" VIEWSONIC P655 DIGITAL MONITOR	449
3.2 GIG MAXTOR/QUANTUM ULTRA HD DRIVE	230	15" SONY N-I L/R CPD100ES DIGITAL MONITOR	529
3.2 GIG SAMSUNG ULTRA DMA HD DRIVE	219	17 N-I DIGHAL MONITOR V/M STD 0.28P	436
3.2 GIG WESTERN DIGITAL ULTRA HD DRIVE	230	17 N-I L/H DIGITAL MUNITUR U 28P MULTIMEDIA	525
PPAG CONVENTEN TO SLOT T MODULE CPU'S - PENTIUM II - PENTIUM III CYRIX/IBM 686M2-266 CPU M2 - MMX CPU CYRIX/IBM 686M2-300 CPU M2 - MMX CPU CYRIX/IBM 686M2-300 CPU M2 - MMX CPU AMD K6 II P-300 3D CPU WITH MMX TECH AMD K6 II P-300 3D CPU WITH MMX TECH AMD K6 II P-400 3D CPU WITH MMX TECH AMD K6 II P-450 3D CPU WITH MMX TECH AMD K6 II P-450 3D CPU WITH MMX TECH AMD K6 II P-450 3D CPU WITH MMX TECH CELERON 333A MTD PPGA CPU INTEL IN BOX CELERON 366A MTD PPGA CPU INTEL IN BOX CELERON 366A MTD PMGA CPU INTEL IN BOX CELERON 400A MTD PGA CPU INTEL IN BOX PENTIUM II 450MTD MMX CPU INTEL IN BOX PENTIUM II 450MTD MMX CPU INTEL IN BOX PENTIUM II 450MTD MMX CPU INTEL IN BOX PENTIUM II 500MTD MMX CPU INTEL IN BOX PENTIUM II 500MTD MMX CPU INTEL IN BOX PENTIUM II 450MTD MMX CPU INTEL IN BOX PENTIUM II 450MTD MMX CPU INTEL IN BOX PENTIUM II 450MTD MMX CPU INTEL PENTIUM II 1450MTD MMX CPU INTEL ARD DISK DRIVES 32 GIG - 14.4 GIG 3.2 GIG MAXTOR/OUANTUM ULTRA HD DRIVE 3.2 GIG SAMSUNG ULTRA DMA HD DRIVE 4.3 GIG WESTERN DIGITAL ULTRA HD DRIVE 4.3 GIG WESTERN DIGITAL ULTRA HD DRIVE	235	KODAK DC CAMERA FLASH RAM 10MB. MONITORS 14" - 21" 14" NON-INT MONITOR L/R STD 15" NON-INT MONITOR L/R STD 15" NON-INT MONITOR MPRIL L/R STD 15" NON-INT MONITOR MPRIL L/R V/M 15" MISUBISHI DV15701 DIGITAL MPRII MON 15" NON-INT MONITOR MPRII L/R MULTIMEDIA 15" VIEWSONIC E655 DIGITAL MONITOR 15" VIEWSONIC E655 DIGITAL MONITOR 15" VIEWSONIC E655 DIGITAL MONITOR 15" NI-DIGITAL MONITOR V/M STD 0.28P MULTIMEDIA 17" NI-L/R DIGITAL MONITOR V/M STD 0.28P MULTIMEDIA 17" NI-L/R DIGITAL MONITOR 0.28P MULTIMEDIA 17" VIMITSUBISHI DV1772E DIGITAL MPRII MON 17" MITSUBISHI DV1772E DIGITAL MPRII MON 17" VIEWSONIC PS775 IGBOX1280 USB DIGITAL MON 17" SONY NI-L/R CPD200ES DIGITAL MON 17" SONY NI-L/R CPD200ES DIGITAL MON 17" SONY NI-L/R GDM200PS DIGITAL MON 19" V/M NI-L/R GDM200PS DIGITAL MON 19" SONY NI-L/R GDM200PS DIGITAL MON KEYBOARDS 104 & MICE	D(0)
4.3 GIG WESTERN DIGITAL ULTRA DMA HD	247	17" MITSURISHI DPI LIS71 DIGITAL MPRII MON	784
6.1 CIC OHANTHA EL HITTO ATA UD DOIVE	200	17" VIEWSONIC PS775 1600x1280 USB DIGITAL MON	980
6.4 GIG SAMSLING LUTRA DMA HD DRIVE	276	17" SONY N-I L/R CPD200ES DIGITAL MON	936
6.4 GIG FILIITSH UII TRA DMA HD DRIVE	304	17" SONY N-I L/R CPD200GS DIGITAL MON	1.189 j
6.4 GIG WESTERN DIGITAL ULTRA ATA HD	283	17" SONY N-I L/R GDM200PS DIGITAL MON	1,632
6.4 GIG IBM ULTRA DMA HARD DISK DRIVE	311	19° V/M N-I L/H 0.26P DIGITAL MONITOR	999
6.4 GIG QUANTUM EX ULTRA ATA HD DRIVE	287	19 SUNY N-1 L/K GUM40UPS DIGITAL MUN	1,9/3
8.4 GIG SAMSUNG ULTRA DMA HD DRIVE	314	KEYBOARDS 104 & MICE	nr I
8.4 GIG WESTERN DISTAL ULTRA ATA SE	336	WIN95 104 KEY STD BTC K/B HONEYWELL K/B GENLINE 104 MICROSOFT K/B NATURAL ELITE 98. MOUSE STD MS COMPATIBLE SERIAL	25
10.2 GIG WESTERN DIGITAL ULTRA ATA-66	374	MICROSOFT K/R NATURAL FLITE 98	78
10.2 GIG QUANTUM FLUITRA ATA HD DRIVE	417	MOUSE STD MS COMPATIBLE SERIAL	10
3.2 GIG WESTERN DIGITAL ULTRA HD DRIVE 4.3 GIG SAMSUNG/FLJITSU UJ/DMA HD DRIVE 4.3 GIG WESTERN DIGITAL ULTRA DMA HD 4.3 GIG WESTERN DIGITAL ULTRA DMA HD 4.3 GIG IBM ULTRA DMA HARD DISK DRIVE 6.4 GIG IBM ULTRA DMA HD DRIVE 6.4 GIG SAMSUNG ULTRA DMA HD DRIVE 6.4 GIG SAMSUNG ULTRA DMA HD DRIVE 6.4 GIG GAMSUNG ULTRA DMA HD DRIVE 6.4 GIG IBM ULTRA DMA HARD DISK DRIVE 8.4 GIG WESTERN DIGITAL ULTRA ATA-66 10.2 GIG WESTERN DIGITAL ULTRA ATA-65 10.2 GIG ULTRA DRIVE 10.3 GIG IBM ULTRA DMA HARD DISK DRIVE 10.3 GIG IBM ULTRA DMA HARD DISK DRIVE 10.3 GIG IBM ULTRA DMA HARD DISK DRIVE 10.3 GIG GUANTUM EU ULTRA ATA-66 10.2 GIG GUANTUM EU ULTRA ATA-66 10.3 GIG IBM ULTRA DMA HARD DISK DRIVE 10.3 GIG GUANTUM EU LUTRA ATA-66 10.3 GIG IBM ULTRA DMA HARD DISK DRIVE 10.3 GIG GUANTUM EU LTRA ATA-65 10.3 GIG IBM ULTRA DMA HARD DISK DRIVE 10.3 GIG SAMSUNG ULTRA ATA-65 10.3 GIG IBM ULTRA DMA HARD SISK DRIVE 10.3 WESTERN DIGITAL ULTRA ATA-66 VIDEO/CAPTURE CARDS - \$3 - TRIDENT	371	MICROSOFT K/B NATURAL ELITE 98. MOUSE STD MS COMPATIBLE SERIAL. MOUSE STD MS COMPATIBLE PS/2 MICROSOFT MOUSE GEN PS/2 SERIAL. MICROSOFT MOUSE PS/2 GEN INTELLI HONEYWELL NO BALL MOUSE MOUSE PAD STANDARD	15
13.3 WESTERN DIGITAL ULTRA ATA-66	463	MICROSOFT MOUSE GEN PS/2 SERIAL	59
13.3 WESTERN DIGITAL ULTRA ATA-66 VIDEO/CAPTURE CARDS - \$3 - TRIDENT S3 TRIO64V- 64B PCI 1MB (UPG. TO 2MB) 4MB EDO VIRGE 3D S3 PCI VIDEO CARD. 4MB EDO TRIDENT AGP UDEO CARD. VIDEO 78AGP NIVIDIA RIVA 128ZX AGP 8MB BLAZE 3D ULTIMATE PCI W/TV OUT/TV TUNER. UDEO/CAPTURE CARDS-DIAMOND-MATROX. 3DEMON VOODOO BANISHEE 2/3D 16MB CARD. KTX VOODOOZ 3D 12 MB ADD-0N CARD. KTX VOODOOZ 3D 12 MB ADD-0N CARD. CREATIVE BANISHEE 16 MEG RETAIL CREATIVE BANISHEE 16 MEG NETAIL CREATIVE BLASTER 12 MEG VOODOO II RET. DIAMOND STEALTH SPEEDSTAR 8MB CEM AGP DIAMOND STEALTH I SZ20 4MB RETAIL PCI DIAMOND STEALTH SPEEDSTAR 8MB CEM AGP DIAMOND MONSTER FUSION 16 MEG. AGP OLEM		MICROSOFT MOUSE PS/2 GEN INTELLI	59 (
S3 TRI064V+ 64B PCI 1MB (UPG. TO 2MB)	49	LIGHET MELT IND DATT MIDDSE	55 (
4MB EDO VIRGE 3D S3 PCI VIDEO CARD	54	MOUSE PAU STANDARU	
4MB EDU TRIUENT AGP VIDEU CARD	60	UD 670 COLOD MIK ICT DOMITED AA	224
BLAZE 3D LILTIMATE PCL W/TV OLIT/TV TUNED	225	HP 695 COLOR INK JET PRINTER A4	249 5
VIDEO/CAPTURE CARDS-DIAMOND-MATROX	Sell	HP 880C COLOR INK JET PRINTER A4	536
3DeMON VOODOO BANSHEE 2/3D 16MB CARD	227	HP 895 CXI COLOR INK JET PRINTER	758
KTX VOODOO2 3D 12 MB ADD-ON CARD	219	HP 1120 C COLOR INK JET PRINTER A3	853
CREATIVE BANSHEE 16 MEG RETAIL	265	HP 1100 LASER PRINTER 8PPM A4	725
DIAMOND CTEALTH CREEDSTAP SAN OFF A CO	318	HP 1100A LASER PHINT/SCAN 8PPM A4	1246
DIAMOND STEALTH IL S220 AMR RETAIL DOL	130	HP OFFICE JET 635C SCAN/COPY/PRINT	736
DIAMOND MONSTER FLISION 16 MEG. AGP OFM	261	HP OFFICE JET 1170C SCAN/COPY/PRI	1365
DIAMOND MONSTER FUSION 16 MEG AGP/PCI	281	HP OFFICE JET 1175C SCAN/COPY/PRI	1732
D/STEALTH VIPER - 550 PCI/AGP 16MB RETAIL	331	EPSON STYLUS COLOR 300 720x360	152
DIAMOND MONSTER FUSION 16 MEG AGP DEM DIAMOND MONSTER FUSION 16 MEG AGP.PCI D/STEALTH VIPER - 550 PCI/AGP 16MB RTAIL. D/STEALTH VIPER - 550 AGP 16MB 0CM. D/STEALTH MONSTER II 3D 12 MEG NO. S.W. D/STEALTH MONSTER II 3D 12 MEG NO. S.W.	293	EPSON STYLUS COLOR 440 720x720	228 :
D/STEALTH II G460 2D/3D AGP 8MB I740 0EM	TAE	MOUSE PAD STANDARD PRINTERS HP- EPSON- CANON HP 670 COLOR INK JET PRINTER A4 HP 685 COLOR INK JET PRINTER A4 HP 880C COLOR INK JET PRINTER A4 HP 880C COLOR INK JET PRINTER A4 HP 810C COLOR INK JET PRINTER A4 HP 1100 COLOR INK JET PRINTER A3 HP 1100 LASER PRINTER BPPM A4 HP 1100 LASER PRINTER BPPM A4 HP 2100 LASER PRINTER 10PPM A4 4MB HP 1100 FICE JET 1170C SCAN/COPY/PRINT HP OFFICE JET 1170C SCAN/COPY/P	494 7
U/31EAE11111 0400 20/30 Mar 6WB 1/40 0EM	140	LI SUN STILUS GULUN PAU PAROXIZU.	104 1

EPSON COLOR PHOTO 700 1440x720		
PSSON STYLUS COLOR #50 1440/720 645 PSSON STYLUS COLOR PHOTO EX. 731 PSSON STYLUS 1520 AS COLOR AS 947 PSSON STYLUS 1520 AS COLOR AS 947 PSSON STYLUS 3000 AZ COLOR AS 3083 CANON BLC 50 A4 COLOR PRINTER PORT 578 CANON BLC 50 A4 COLOR PRINTER PORT 329 CANON BLC 80 SCANNER OPTION 127 CANON BLC 80 SCANNER OPTION 127 CANON BLC 80 SCANNER OPTION 127 CANON BLC 85SSP A4 COLOR 139 CANON BLC 4510 SP A4 COLOR 149 CANON BLC 4510 SP A4 COLOR 149 CANON BLC 5000 A4 COLOR NEW 500 CANON BLC 5000 A2 COLOR 1237 CANON LEP 660 LASER A4 6PPM 496 SCANNERS STD - HP - CANON KTX COLOR FLATBED SCANNER 127 HP 4100C FLATBED SCANNER 127 HP 5100C FLATBED SCANNER 127 HP 5100C FLATBED SCANNER NEW USB 271 HP 5100C FLATBED SCANNER COLOR 449 HP 6200C FLATBED SCANNER COLOR 277 HP 6250C FLATBED S	EDCON COLOR DUOTO 700 1440-700	200
EPSON STYLUS 3000 AZ COLOR AZ CANON BUC 50 A4 COLOR PITTER PORT 578 CANON BUC 80 A4 COLOR PITTON 127 CANON BUC 80 SCANNER OPTION 127 CANON BUC 80 SCANNER OPTION 127 CANON BUC 255SP A4 COLOR 132 CANON BUC 255SP A4 COLOR 139 CANON BUC 4310 SP A4 COLOR 145 CANON BUC 4510 SP A4 COLOR 145 CANON BUC 5000 A4 COLOR 145 CANON BUC 5000 A4 COLOR 145 CANON BUC 5000 A4 COLOR 127 CANON BUC 5500 A2 COLOR 127 CANON BUC 7100 A4 COLOR NEW 500 CANON BUC 5500 A2 COLOR 127 CANON LEP 660 LASER A4 6PPM 496 SCANNERS STD - HP - CANON KTX COLOR FLATBED SCANNER 131 ARTEC COLOR FLATBED SCANNER 147 CANON ENDER 147 FLATBED SCANNER NEW USB 171 HP 4100C FLATBED SCANNER COLOR 127 HP 4500C FLATBED SCANNER COLOR 127 HP 6250C FLATBED SCANNER COLOR 127 HP 6250C FLATBED SCANNER NEW 147 CANON FBS20P COLOR SCANNER NEW 147 CANON FBS20P COLOR SCANNER NEW 147 CANOSCAN FLATBED CS300S COLOR 147 CANOSCAN FLATBED CS300S COLOR 147 CASES DESKTOP - FULL - AT - ATX DESKTOP CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE CT 154 ATX GALAXY MIDI CASE DELUXE CT 156 ATX DESKTOP CASE OF COLOR 181 IOMEGA JAZ CART 1000MB 3 PACK 100MEGA JAZZ CARD 100MB 3 PACK 100MEGA JAZZ	EDCON CTVI HE COLOR OF SEA 440-700	330
EPSON STYLUS 3000 AZ COLOR AZ CANON BUC 50 A4 COLOR PITTER PORT 578 CANON BUC 80 A4 COLOR PITTON 127 CANON BUC 80 SCANNER OPTION 127 CANON BUC 80 SCANNER OPTION 127 CANON BUC 255SP A4 COLOR 132 CANON BUC 255SP A4 COLOR 139 CANON BUC 4310 SP A4 COLOR 145 CANON BUC 4510 SP A4 COLOR 145 CANON BUC 5000 A4 COLOR 145 CANON BUC 5000 A4 COLOR 145 CANON BUC 5000 A4 COLOR 127 CANON BUC 5500 A2 COLOR 127 CANON BUC 7100 A4 COLOR NEW 500 CANON BUC 5500 A2 COLOR 127 CANON LEP 660 LASER A4 6PPM 496 SCANNERS STD - HP - CANON KTX COLOR FLATBED SCANNER 131 ARTEC COLOR FLATBED SCANNER 147 CANON ENDER 147 FLATBED SCANNER NEW USB 171 HP 4100C FLATBED SCANNER COLOR 127 HP 4500C FLATBED SCANNER COLOR 127 HP 6250C FLATBED SCANNER COLOR 127 HP 6250C FLATBED SCANNER NEW 147 CANON FBS20P COLOR SCANNER NEW 147 CANON FBS20P COLOR SCANNER NEW 147 CANOSCAN FLATBED CS300S COLOR 147 CANOSCAN FLATBED CS300S COLOR 147 CASES DESKTOP - FULL - AT - ATX DESKTOP CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE CT 154 ATX GALAXY MIDI CASE DELUXE CT 156 ATX DESKTOP CASE OF COLOR 181 IOMEGA JAZ CART 1000MB 3 PACK 100MEGA JAZZ CARD 100MB 3 PACK 100MEGA JAZZ	EPSUN STYLUS CULUR 830 1440X720	645
EPSON STYLUS 3000 AZ COLOR AZ CANON BUC 50 A4 COLOR PITTER PORT 578 CANON BUC 80 A4 COLOR PITTON 127 CANON BUC 80 SCANNER OPTION 127 CANON BUC 80 SCANNER OPTION 127 CANON BUC 255SP A4 COLOR 132 CANON BUC 255SP A4 COLOR 139 CANON BUC 4310 SP A4 COLOR 145 CANON BUC 4510 SP A4 COLOR 145 CANON BUC 5000 A4 COLOR 145 CANON BUC 5000 A4 COLOR 145 CANON BUC 5000 A4 COLOR 127 CANON BUC 5500 A2 COLOR 127 CANON BUC 7100 A4 COLOR NEW 500 CANON BUC 5500 A2 COLOR 127 CANON LEP 660 LASER A4 6PPM 496 SCANNERS STD - HP - CANON KTX COLOR FLATBED SCANNER 131 ARTEC COLOR FLATBED SCANNER 147 CANON ENDER 147 FLATBED SCANNER NEW USB 171 HP 4100C FLATBED SCANNER COLOR 127 HP 4500C FLATBED SCANNER COLOR 127 HP 6250C FLATBED SCANNER COLOR 127 HP 6250C FLATBED SCANNER NEW 147 CANON FBS20P COLOR SCANNER NEW 147 CANON FBS20P COLOR SCANNER NEW 147 CANOSCAN FLATBED CS300S COLOR 147 CANOSCAN FLATBED CS300S COLOR 147 CASES DESKTOP - FULL - AT - ATX DESKTOP CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE CT 154 ATX GALAXY MIDI CASE DELUXE CT 156 ATX DESKTOP CASE OF COLOR 181 IOMEGA JAZ CART 1000MB 3 PACK 100MEGA JAZZ CARD 100MB 3 PACK 100MEGA JAZZ	EPSON STYLUS COLOR PHOTO EX	731
CANON BJC 2555P A4 COLOR 132 CANON BJC 4310 SP A4 COLOR 199 CANON BJC 4310 SP A4 COLOR 415 CANON BJC 4310 SP A4 COLOR 456 CANON BJC 5000 A4 COLOR NEW 500 CANON BJC 7000 A4 COLOR 1237 CANON LED FLATBED SCANNER 131 ARTIEC COLOR FLATBED SCANNER 131 ARTIEC COLOR FLATBED SCANNER 132 PH 9 5100C FLATBED SCANNER COLOR 449 HP 6200C FLATBED SCANNER COLOR 247 HP 6250C FLATBED SCANNER COLOR 249 HP 6200C FLATBED SCANNER COLOR 247 CANON FBS20P COLOR SCANNER NEW 247 CANON FBS20P COLOR SCANNER NEW 247 CANOSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CASES DESKTOP - FULL - AT - ATX DEKTOP/MINI TOWER CASE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W CT 164 ATX CASE EXTRA FAN COOLING 19 MISC DRIVES SIDMERGA LIST 20 - JAZZ LS 120MB SLIPER 120MB IDE DRV 164 LS 120MB FLOPPY MEDIA 18 IDMEGA JDP DRIV INTERNAL IDE 100MB 164 IDMEGA JDP DRIV EXTERNAL PARALLEL 241 IDMEGA JDP DRIV INTERNAL IDE 100MB 164 IDMEGA JAZZ JET CARD INTERNAL IDE 100MB 164 I	EPSON STYLUS 1520 A3 COLOR A3	947
CANON BJC 2555P A4 COLOR 132 CANON BJC 4310 SP A4 COLOR 199 CANON BJC 4310 SP A4 COLOR 415 CANON BJC 4310 SP A4 COLOR 456 CANON BJC 5000 A4 COLOR NEW 500 CANON BJC 7000 A4 COLOR 1237 CANON LED FLATBED SCANNER 131 ARTIEC COLOR FLATBED SCANNER 131 ARTIEC COLOR FLATBED SCANNER 132 PH 9 5100C FLATBED SCANNER COLOR 449 HP 6200C FLATBED SCANNER COLOR 247 HP 6250C FLATBED SCANNER COLOR 249 HP 6200C FLATBED SCANNER COLOR 247 CANON FBS20P COLOR SCANNER NEW 247 CANON FBS20P COLOR SCANNER NEW 247 CANOSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CASES DESKTOP - FULL - AT - ATX DEKTOP/MINI TOWER CASE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W CT 164 ATX CASE EXTRA FAN COOLING 19 MISC DRIVES SIDMERGA LIST 20 - JAZZ LS 120MB SLIPER 120MB IDE DRV 164 LS 120MB FLOPPY MEDIA 18 IDMEGA JDP DRIV INTERNAL IDE 100MB 164 IDMEGA JDP DRIV EXTERNAL PARALLEL 241 IDMEGA JDP DRIV INTERNAL IDE 100MB 164 IDMEGA JAZZ JET CARD INTERNAL IDE 100MB 164 I	EPSON STYLUS 3000 A2 COLOR A2	3083
CANON BJC 2555P A4 COLOR 132 CANON BJC 4310 SP A4 COLOR 199 CANON BJC 4310 SP A4 COLOR 415 CANON BJC 4310 SP A4 COLOR 456 CANON BJC 5000 A4 COLOR NEW 500 CANON BJC 7000 A4 COLOR 1237 CANON LED FLATBED SCANNER 131 ARTIEC COLOR FLATBED SCANNER 131 ARTIEC COLOR FLATBED SCANNER 132 PH 9 5100C FLATBED SCANNER COLOR 449 HP 6200C FLATBED SCANNER COLOR 247 HP 6250C FLATBED SCANNER COLOR 249 HP 6200C FLATBED SCANNER COLOR 247 CANON FBS20P COLOR SCANNER NEW 247 CANON FBS20P COLOR SCANNER NEW 247 CANOSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CANSCAN FLATBED SCANNER 164 CANON FBS20P COLOR SCANNER NEW 247 CASES DESKTOP - FULL - AT - ATX DEKTOP/MINI TOWER CASE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W P/S CT 152 ATX MIDI TOWER CASE DELUXE W CT 164 ATX CASE EXTRA FAN COOLING 19 MISC DRIVES SIDMERGA LIST 20 - JAZZ LS 120MB SLIPER 120MB IDE DRV 164 LS 120MB FLOPPY MEDIA 18 IDMEGA JDP DRIV INTERNAL IDE 100MB 164 IDMEGA JDP DRIV EXTERNAL PARALLEL 241 IDMEGA JDP DRIV INTERNAL IDE 100MB 164 IDMEGA JAZZ JET CARD INTERNAL IDE 100MB 164 I	CANON B IC 50 A4 COLOR PRINTER PORT	578
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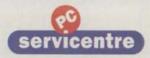
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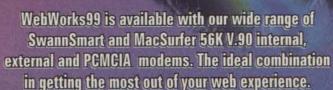


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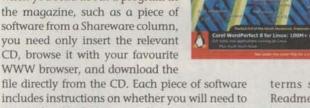
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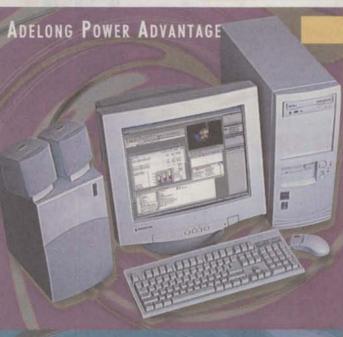
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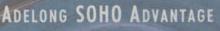
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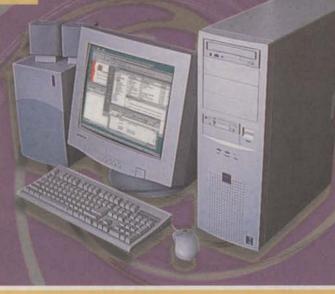
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ADVANTAGE DIAMOND



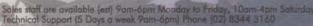
UPGRADES FOR THE ADVANTAGE DIAMOND PRO

128Mb PC-100 SDRAM \$175 19" Monitor \$415 \$75 56k Internal Modem 3 Year on-site warranty Australia wide

UPGRADES FOR THE ADVANTAGE DIAMOND

16Mb Diamond Viper V550 AGP Graphics Card \$95 64Mb PC-100 SDRAM \$85 17" Monitor \$249 56k Internal Modem 3 Year on-site warranty Australia wide

Rentals based on a 36 month term.



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Systems



The affordable PC for core business needs. An IBM PC 300GL with a Pentium II processor offers the raw power your newest business applications need while maintaining exceptional value and affordability. It is designed to help

. Enabled for IBM's innovative Wake on LAN technology

you manage your business, and your budget.

 Includes Client Services for Netfinity Manager, LANClient Control Manager, Intel®'s LANDesk® Client Manager and Tivoll Lightweight Client Framework

SMART Reaction(TM) software helps protect business data

. Enhanced Asset Information Area (on an EEPROM chip) recorded with system and end-user information

. Easy to service and upgrade with an NLX or ATX motherboard and advanced chassis design

PC300GL Celeron 366Mhz

- . Intel Celeron 366MHz
- 128KB Coche
- . 32MB SDRAM
- 3.5" 1.44MB Diskette
- . 4.2GB ATA Hard Disk Drive
- . 2MB SGRAM S3 Trio3D AGP Graphics Card
- . 15" Colour Monitor
- . Enhanced Keyboard & Mouse
- . Windows. 98

\$1895 SYIBMOOD

IBM PC300GL Pentium II 350Mhz

- . Intel Pentium II 350MHz
- 512KB Cache
- 32MB SDRAM
- 3.5" 1.44MB Diskette
- . 3.26B ATA Hard Disk Drive
- . 2MB SGRAM 53 Trio3D AGP Graphics Cord
- 15" Colour Monitor
- . Enhanced Keyboard & Mouse
- · Windows, 95

2225 SYIBMOOT

IBM PC300GL Pentium II 400Mhz

- . Intel Pentium II 400MHz
- 512KB Cache
- . 32MB SDRAM
- 3.5" 1.44MB Diskette
- . 3.2GB ATA Hard Disk Drive
- 2MB SGRAM S3 Trio30 AGP Graphics Cord
- . 15" Colour Monitor
- . Enhanced Keyboard & Mouse
- · Windows, 98

2395 SYIBMOO2

IBM PC300GL Pentium II 450Mhz

- . Intel Pentium II 450MHz
- = 512KB Cache
- . 64MB SDRAM
- * 3.5" 1.44MB Diskette
- . 6.46B ATA Hard Disk Drive
- . 4MB SGRAM S3 Trio3D AGP Graphics Card
- * 15" Colour Monitor
- · Enhanced Keyboard & Mouse
- Windows, 98

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Aptiva E Series

Delivering the ideal combination of performance and affordability helping you excel at work, play and school. Software bundle including: Microsoft Windows 98 and Lotus Smartsuite Millennium Version plus IBM Via Voice 98 - Office Edition, Netscape Navigator, Microsoft Internet Explorer and Norton Antivirus (OEM version)

Aptiva AMD K6-2 333MHz Processor Aptiva AMD K6-2 350MHz Processor

- 512k Cache
- . 64MB SDRAM
- . 4GB Ultra ATA Hard Drive
- . 8MB 3D AGP Graphics
- * 15" Colour Monitor.
- · 32x CD-ROM
- Infinity Speakers
- * 104KB & Mouse . 56K Fax/Modem
- · Windows 98

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- 512k Cache
- · 64MB SDRAM
- . 6GB Ultra ATA Hard Drive
- 8MB 3D AGP Graphics
- 15" Colour Monitor.
- * 32x CD-ROM
- · Infinity Speakers
- · 104KB & Mouse
- 56K Fax/Modem
- · Windows 98

2795 SYIBMOOS

Aptiva Celeron 400MHz Processor

- . 128k Cache
- · 64MB SDRAM
- . 8GB Ultra ATA Hard Drive
- 3D Graphics Bluster 128ZX
- . 15" Colour Manitor
- 32x CD-ROM
- Infinity Speakers . 104KB & Mouse
- 56K Fax/Modem
- Windows 98

2645 SYIBMOOF

Windows 98

Aptiva Pentium II 400MHz Processor • 512k Cache

- 64MB SDRAM
- · 10GB Ultra ATA Hard Drive
- 3D Graphics Bluster 128ZX
- 15° Colour Monitor
- · DVD-4 ROM
- · Infinity Speakers . 104KB & Mouse
- 56K Fax/Modem

3295 SYIBM007



Add \$275 for 17" Monitor

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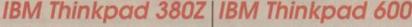
Notebooks



I-SERE

The perfect partner for students and business professionals, the i-Series is IBM's most affordable notebook combing a sleek design with reliability and breathtaking multimedia capabilities.

Intel Pentium Processor 266Mhz with MMX Pentium Processor 300MMX 32MB SDRAM (MAX 256MB) 32MB SDRAM (MAX 256MB) 3.2GB EIDE HDD 20X CD-ROM 2MB Neomagic Graphics 12.1" TFT Screen Intergrated 56K Fax/Modem Yamaha SoundCard Yamaha SoundCard Altec Lansing Audio Altec Lansing Audio Windows 98



For the power of a desktop in a mobile unit look no further than the IBM Thinkpad 380Z range. With an Intel Pentium II 233Mhz Processor the Thinkpad provides leading edge technology at an affordable price. In addition an innovative design combines an integrated disk drive, CD-ROM and hard drive in one convenient and easy to use package.

Intel Pentium II Processor 233Mhz with MMX 32MB SDRAM (MAX 256MB) 4GB EIDE HDD 24X CD-ROM 13.3" TFT Screen SoundBlaster Pro Speakers with subwoofer Windows 98



With the new ThinkPad 600, IBM has assembled the perfect balance of mobile computing, power and portability. The ThinkPad 600 delivers award winning technology, vibrant mobile multimedia and easy connectivity. With a travel weight of 2.2kg the ThinkPad is the ideal travel companion which is ready to work when you are.



IBM Thinkpad 770

For top-of-the-line power, performance and versatility, count on the ThinkPad 770. It's loaded with the biggest displays, tast intel® Mobile Pentium® II processors, with AGP for greater graphics capabilities, complete multimedia capabilities, DVD playback and advanced communications.

Intel Pentium II Processor 300Mhz 64MB SDRAM 4MB Graphics Card MPEG-1 & **DVD-1** Playback 14.1" TFT Screen MPEG-1 & DVD-1 Playback SRS 3D Sound & Dolby Digital Output 56K Fax/Modem



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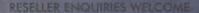
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TOSHIBA

Notebooks

AFFORDABLE PERFORMANCE

The Satellite Series has been specifically designed to bring you maximum power in a high value, easy-to-use, highly reliable package. Fully networkable, with large active or passive screens and superb performance to make light work of the heaviest workloads. High value, high performance, and highly reliable. The Satellite Series offers you Pentium II processing with large keyboard and screens, as well as integrated 'triple spindle' drives (CD, floppy and hard disk) and power management to maximise battery life.



SATELLITE 4030CDT

- ♦ Intel® Celeron® processor, 300MHz
- Integrated design with built-in diskette drive
- ♦ 24X max. speed CD-ROM
- · 4Gb hard disk drive
- · Optional Port Replicator
- ◆ 13.3" 1024 x 768 TFT active matrix colour display
- ◆64MB high performance Synchronous DRAM, expandable to 192MB
- ♦ Windows® 98

\$3995_{NBTOS047}



SATELLITE 4000CDT

- Intel Mobile Pentium II processor, 233MHz
- ♦ 12.1" TFT Active Matrix Colour Display
- · Built-in diskette drive
- ♦ 24X max. speed CD-ROM
- 4Gb hard disk drive
- 32MB high performance Synchronous DRAM, expandable to 160MB
- Windows 98 operating system

\$3595NBTOS042

SATELLITE 4060XCDT

- ◆ Intel® Pentium II® processor, 333MHz
- . Integrated design with built-in diskette drive
- ♦ 24X max. speed CD-ROM
- · 4Gb hard disk drive
- · Optional Port Replicator
- ♦ 14.1" 1024 x 768 TFT active matrix colour display
- 64MB high performance Synchronous DRAM, expandable to 192MB
- ♦ Windows® 98

\$5225 NBTOS048

SATELLITE 4010CDT

- ◆ Intel Mobile Pentium II processor, 266MHz
- ◆ 12.1" TFT Active Matrix Colour Display
- ◆ Built-in diskette drive
- ◆ 24X max. speed CD-ROM
- 4Gb hard disk drive
- 32MB high performance Synchronous DRAM, expandable to 160MB
- ♦ Windows® 98

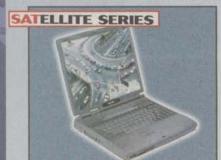
\$3675_{NBTOS045}

SATELLITE 4080XCDT

- ♦ Intel® Mobile Pentium®II processor, 366MHz
- Integrated design with built-in diskette drive
- ♦ 24X max. speed CD-ROM
- ♦ 6.4Gb hard disk drive
- Optional Port Replicator
- ◆ 14.1" 1024 x 768 TFT active matrix colour display
- ♦ 64MB high performance Synchronous DRAM, expandable to 192MB
- ♦ Windows® 98

\$6299_{NBTOS049}

PERFORMANCE ON A BUDGET



The Satellite 2520CDT provides exceptional value without compromising performance or reliability. Superb storage, plenty of expansion options and a dynamic sound system make the Toshiba Satellite 2520CDT a portable computer perfect for today's business and individual users. Using the AMD K6-II to obtain performance similar to Pentium II at a lower cost, this notebook is great for no affordable computing.

SATELLITE 2520CDT

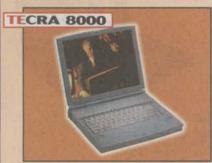
- ◆ AMD K6- II 300MHz processor
- 12.1" TFT Active Matrix Colour Display
- · Built-in diskette drive
- ♦ 24X max. speed CD-ROM
- 4Gb hard disk drive
- ♦ 64MB high performance Synchronous DRAM, expandable to 160MB
- ◆ Windows® 98 operating system

\$3425 NBTOS050



DESKTOP PERFORMANCE

The Tecra 8000 Series is the ideal business desktop-replacement mobile computer. With a Tecra, you are never chained to a desk. Tecra also delivers exceptionally low total cost of ownership through a single software image, architecture longevity and a full 3 year warranty. No wonder Tecra is the dream deployment platform for so many corporations. The Tecra 8000 Series offers you an internal modem,333Mhz to 366Mhz Intel Pentium I I processors, optional CD or DVD capabilities and up to 13.3" true life colour display.



6

TECRA 8000 PH 333

- ♦ Intel® Mobile Pentium® II processor, 333MHz
- ◆ Integrated design with built-in diskette drive
- ◆ 24X max. speed CD-ROM
- ♦ 6.4Gb hard disk drive
- ◆ Optional Port Replicator
- ◆13.3" 1024 x 768 TFT active matrix colour display
- ♦64MB high performance Synchronous DRAM, expandable to 192MB
- ♦ Windows® 98

\$6599 NBTOS051

TECRA 8000 PII 366

- ♦ Intel® Mobile Pentium® II processor, 366MHz
- Integrated design with built-in diskette drive
- ♦ 24X max. speed CD-ROM
- ♦ 10Gb hard disk drive
- ◆ Optional Port Replicator
- ◆13.3" 1024 x 768 TFT active matrix colour display
- ♦ 64MB high performance Synchronous DRAM, expandable to 192MB
- ♦ Windows® 98

\$8499_{NBTOS052}

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Processor







Code	Model	Price
CPAMDO	15 AMD K6-2 333	\$179
CPAMD0	10 AMD K6-2 350	\$245
CPAMDO	14 AMD K6-2 400	\$365
Meatsini	and Fan	
	Model	Price
MSADEO	06 Socket 7 CPLL FAN	\$15



Code	Model	Price
CPIBM008	M2-300MHZ	\$99
CPIBM009	M2-333MHZ	\$149
Heatsink	and Fan	
Code	Model	Price
MSADEOO	6 Socket 7 CPLI FANI	212

Memory

SDRAM - For use in current Pentium / Pentium II systems utilising Intel TX / LX / BX Chipsets. PC-100 for 100Mhz Chipsets. Use individually. All SDRAM is 168 Pin.

* For use with latel BX & Super Socket 7 Mainboards

Code	Model	Price
RAGEN008	32MB SDRAM	\$88
RAGEN009	64MB SDRAM	\$185
RAGEN021	128MB SDRAM	\$379
RAGEN022	64MB PC-100 SDRAM	\$195
RAGEN023	128MB PC-100 SDRAM	\$365



EDO RAM - For use in newer 486 systems and most Pentium / Pentium Pro style systems. Used in pairs in Pentiums & Pentium Pro's.

Code	Model	Price
RAGEN005	16MB EDO SIMM 72 Pin	\$69
RAGEN006	32MB EDO SIMM 72 Pin	\$135



Fast Page RAM - For use in older 486 & Pentium systems and some printers. Use in pairs in Pentiums.

RAGEN001	8MB SIMM 72 Pin	\$45
RAGEN002	16MB SIMM 72 Pin	\$75
RAGEN003	32MB SIMM 72 Pin	\$155

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Technical Support (5 Days a week 9am-6pm) Phone (02) 8344, 3160

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A Open

Mainboards

AOpen AX6BC Mainboard

Introducing the AOpen AX6BC Mainboard featuring the Intel BX Chipset. A unique jumperless design, CPU monitoring & protection circuitry combines ease of use with reliability and performance, Winner of many international awards you can be sure that the AX6BC Mainboard will work with you, not against you.



- Supports Intel Pentium II 233 450Mhz & Celeron Processors
- 5 x PCI, 2 x ISA, 1 x AGPx2 Expansion slots
- 768MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- 2 x EIDE Controller & ATX Form Factor
- Supports Wake on LAN, DMI, SB-LINK

AOpen AX63 Pentium II Mainboard

The AOpen AX63 Mainboard brings true computing performance at a very affordable price. Powered by the advanced VIA Apollo Pro Plus AGP chipset the AX63 Mainboard supports technologies such as lumperless design, Resetable Fuse for USB & K/B, BIOS flash protection and CPU protection.



- Supports Intel Pentium II 233 -450Mhz & Celeron Processors
- 5 x PCI, 2 x ISA, 1 x AGPx2 Expansion slots
- 768MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- 2 x EIDE Controller & ATX Form Factor3

Building on the quality & performance of the AX6BC Mainboard the new Aopen AX6B comes standard with an Adaptec 7880P Ultra Wide SCSI Controller (onboard). An excellent choice for mld range servers and workstations where speed is a mustl



- Supports Intel Pentium II 233 -450Mhz & Celeron Processors
- 4 x PCI, 3 x ISA, 1 x AGPx2 Expansion slots
- 768MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- SCSI on board Adaptec 7880P SCSI Controller With 68pin U/W & 50pin Ultra SCSI connectors
- 2 x EIDE Controller & ATX Form Factor
- Supports Wake on LAN, DMI, SB-LINK



AOpen AX3L Celeron Mainboard

The AOpen AX3L supports the latest generation of Intel Celeron socket 370 (PPGA) Processors. Featuring an ESS Solo 1 PCI Soundcard the AX3L Mainboard provides an excellent computing platform on which to build.

- Supports Intel Celeron 300A - 400Mhz
- 4 x PCI, 2 x ISA, 1 x AGPx2 **Expansion slots**
- 384MB SDRAM for 3 x DIMM slots
- 2 x Serial, 1 x Parallel, 2 x USB Ports
- 2 x EIDE Controller & ATX Form Factor

BONUS Norton AntiVirus With All Adpen Mainboards

AOpen EIDE CD-ROM

- ATAPI IDE CD-ROM
- Ultra DMA Supported
- 512Kbytes buffer
- Compatible with CD-DA, CD-ROM/XA, CD-I/MPEG, Photo CD, Karaoke CD, CD, CD-RW, Packet write
- Audio Extraction

AOpen CD-940E

MAX Transfer Rate 7200KB/sec with 48X

48X CD-ROM

AOpen CD-948E

MAX Transfer Rate 6000KB/sec with 40X

40X CD-ROM



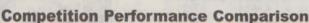
Hard Drives

Western Digital

WD Caviar®

Introducing the new range of Western Digital Caviar

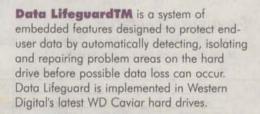
EIDE hard drives. Sporting the industry's first Ultra ATA/66 high speed data transfer feature, the new Caviar drives feature a maximum transfer rate of 66Mb/s. That's double the speed of its nearest rival. All Western Digital Caviar drives undergo 200 rigorous tests before shipping to ensure compatibility and reliability with all your existing hardware & software applications.



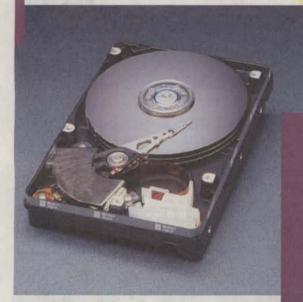


WINBENCH 98, Test Performance on a PII-300, Win 98

Backwards compatible with Ultra DMA 33 and IDE controllers

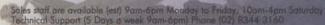


Ultra ATA/66 is the latest in hard drive technology providing a maximum transfer rate of 66Mb/s as compared to the industry standard of 33Mb/s. Backwards compatible with all existing IDE & EIDE ports the Western Digital Caviar drives will integrate smoothly in your PC or MAC G3.



- ULTRA ATA 66
- 66Mb/Sec Transfer Rate
- ◆ 512Kb Cache For Maximum Performance
- Low 9.5ms Access Speed
- **△** 5400RPM

Code	Model	Size (GB)	Transfer Rate	Price
HDWES002	AC14300	4.3GB	66Mb/s	\$265
HDWES003	AC25400	6.4GB	66Mb/s	\$305
HDWES004	AC28400	8.4GB	66Mb/s	\$339
HDWES005	AC310200	10.2GB	66Mb/s	\$405
HDWES006	AC313000	13.1GB	66Mb/s	\$499















Hard Drives

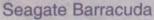
High performance disk solutions from Seagate catering for: Seagate

- High end multimedia & video applications (A/V)
- Graphics and 3D Applications
- High performance workstations, servers and super computers Internet/Intranet based webservers

Seagate Medalist Pro

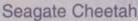
Cost effective, high performance SCSI hard drives with 512K cache and a spindle speed of 7200RPM.

	Code	Model	Capacity	Interface	Tr/Rate	Price
Ī	HDSGT025	ST36530N	6.4GB	Ultra SCSI	20Mbps	\$599
	HDSGT026	ST36530W	6.4GB	Ultra Wide SCSI	40Mbps	\$599



High Capacity, ultra high performance SCSI Hard Drives with a seek time of 7ms and a spindle speed of 7200RPM.

	Code	Model	Capacity	Interface	Tr/Rate	Price
Ī	HDSGT014	ST39173W	9.1GB	Ultra Wide SCSI	40Mbps	\$875
	HDSGT027	ST39173LC	9.1GB	LVD 80 Pin	80Mbps	\$875
	HDSGT028	ST39173LW	9.1GB	LVD 68 Pin	80Mbps	\$875
	HDSGT023	ST118273W	18GB	Ultra Wide SCSI	40Mbps	\$1595
	HDSGT029	ST118273LC	18GB	LVD 80 Pin	80Mbps	\$1595
	HDSGT030	ST118273LW	18GB	LVD 68 Pin	80Mbps	\$1595



Ultimate Performance for servers and high-powered workstations. Features an industry leading 10,000 RPM spindle speed & a cache buffer of 512K.

Code	Model	Capacity	Interface	Tr/Rate	Price
HDSGT031	ST39102LC	9.1GB	LVD 80 Pin	80Mbps	\$1345
HDSGT032	ST39102LW	9.1GB	LVD 68 Pin	80Mbps	\$1345
HDSGT033	ST118202LC	18GB	LVD 80 Pin	80Mbps	\$2195
HDSGT034	ST118202LW	18GB	LVD 68 Pin	80Mbps	\$2195





LVD: Low Voltage Differential Drives are for use with Ultra 2 SCSI Controllers such as the Adaptec 2940U2W Controller giving you a transfer rate of 80Mhps. Backwards compatible with Ultra & Ultra Wide SCSI Controllers.

IBM Hard Drives

TravelStar 2.5" IDE Drives

Experience blistering performance on a notebook computer-The IBM range of TravelStar IDE drives feature 5 2 of cache accessed via an Ultra ATA interface. Compatible with all notebook & laptop computers.

LAPTOP DRIVES

Code	Capacity	Seek Time	Tr/Rate	Price
HDIBM002	3.2GB	13ms	33Mb/s	\$399.
HDIBM025	4.8GB	12ms	33Mb/s	13430
HDIBM026	5.4GB	12ms	33Mb/s	\$505
HDIBM027	6.4GB	12ms	33Mb/s	\$585

UltraStar 3.5" SCSI Drives

Quality, performance at a reasonable price is what the IBM Caractar range of hard drives offer. Featuring a seek time of 7.5ms, cache size of 512K and a spindle speed of 7200 RPM be sure that the USAStar range of drives will give you sizzling performance that wont break the bank!

A STATE OF THE PARTY OF THE PAR	Interface	Tr/Rate	Price
GB	Ultra Wide SCSI	40Mb/s	\$470
3B	Ultra Wide SCSI	40Mb/s	\$795
	GB GB	THE RESERVE OF THE PERSON NAMED IN COLUMN 1	THE RESERVE THE PERSON NAMED IN COLUMN 2 I

Quantum Hard Drives

Quantum

The new Quantum Fireball EX EIDE hard disk drives reaffirms the Fireball brand as the standard in desktop storage. Quantum drives feature Shock Protection SystemTM (SPS) which prevents shock from having a detrimental effect on a drives long term reliability and data integrity.

Code	Capacity	Seek Time	Spindle Speed	Tr/Rate	Price
HDQTM041	3.2GB	9.5ms	5400 RPM	33Mb/s	\$239
HDQTM039	6.4GB	9.5ms	5400 RPM	33Mb/s	\$299
HDQTM038	12.7GB	9.5ms	5400 RPM	33Mb/s	\$465





SCSI Cards



Adaptec 2906 PCI card for desktop PCs

Connect up to 7 SCSI devices and gain great performance by moving to SCSI with the Adaptec 2906. Run your ZIP drive or Scanner up to 6 times faster than with a parallel port connection. Adaptec EZ-SCSI Software is included to help you manage your peripherals.



Adaptec 2940 UW PCI card

For performance systems

The Adaptec AHA-2940 Ultra Wide host



adapter is the ideal SCSI adapter for entry level servers and workstations. It connects up to 15 devices and moves data at up to 40Mb/s. For unrivalled system performance and peripheral compatibility look no further than the AHA-2940UW.

Adaptec SlimSCSI 1460

Connect SCSI devices to your laptop

For attaching a wide range of SCSI devices such as drives, CDROMs,



peripherals and scanners to your notebook computer look no further than the Adaptec 1460 SlimSCSI card. Designed for Windows 95/98 and includes DB25 and Honda50 connections.

295

EASY CD CREATOR DELUXE EDITION

The easiest way to make your own CDs!

The ultimate in CD mastering software is here today. Share CD photo albums and send video postcards on CD to friends and family. Turn



scratchy LPs into digital CDs and enhance your custom CDs with cool sound effects. And when it comes to backing up important files, there's nothing better than a virtually indestructible CD. Package also includes CD Copier, Video CD Creator, Picture CD Creator and Jewel Case creator software allowing you to design and personalize your CDs.

CD Mastering is easier than ever!

Adaptec 2940U2W

Unleash the full potential of your server or workstation



When it comes to boosting the performance of servers and workstations to 80Mb/s utilising Ultra2 SCSI (LVD) technology. By combining the Adaptec 2940U2W with high-performance disk drives like Seagate's Cheetah & Barracuda, and Ouantum's Viking and Atlas, you'll get performance worth howling about. Maximum SCSI cable length of 12 meters.

Adaptec MiniSCSI 1350

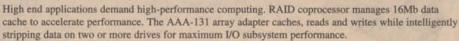
Mini SCSI 1350 is a simple and inexpensive way to connect SCSI peripherals to a computer. It's perfect for portable or desktop



computers that lack SCSI expansion capabilities. It works by converting your parallel port to SCSI in seconds and allows up to seven SCSI devices to be chained. Lightweight and easy to carry around.

Adaptec AAA131

Delivers up to twofold performance increase for Windows NT PCs



AAA-131 Single Channel

AAA-131 Single Channel 16Mb Cache

AAA-133 3 Channel 120Mb

RAID



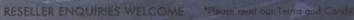












CREATIVE Multimedia



PC-DVD Encore 5X with Dxr2

technology

Creative® PC-DVD™ Encore 5X brings affordable thirdgeneration DVD-ROM technology to your PC. Dolby® Digital (AC-3*) 5.1-channel* audio, 32X maximum CD-ROM speeds, and Dxr™2 picture enhancement technology provides an exciting way to watch DVD movies and run CD programs.

Connect the Dxr™2 board to your TV and watch DVD movies from the comfort of your family room, Play thousands of Video CD Titles as well.



CREATIVE BLUSTER

Graphics Bluster RIVA TNT



Delivers world-class 2D and 3D acceleration using nVidia's new RivaTNT processor Ultra-wide, highspeed 128-bit memory architecture and Twin-Texel 3D pipeline deliver mindnumbing speed in virtually any application Loaded with 16MB of Synchronous

Memory and a powerful 250MHz DAC for incredibly high resolutions and refresh rates with brilliant, vivid colour





Sound Bluster Live! Value



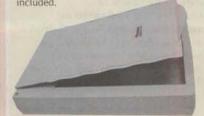
Interested in a powerful audio/gaming experience? Listen to game and music content come alive using the analog four-speaker output - even if your sound source doesn't support 3D sound! The Sound Bluster Live! Value utilizes the

EMU10K1 audio processor as the Sound Bluster Livel, the most powerful audio chip available today. This translates into higher frame rates in your games, more bandwidth for 3D audio and an all around fantastic sounding audio experience.

SCAN WITH PLUSTEK

Plustek 6000P

The ideal A4 30-bit colour flatbed scanner featuring a maximum resolution of 300 dpi (4800 dpi interpolated). Imaging and OCR software





Plustek 9636P

The OpticPro 9636P is a 36-bit colour flatbed scanner which connects seaminglessly and easily to your PCs parallel port. With impressive specifications such as 9600 dpi scanning and an optical resolution of 600 x 1200 dpi the OpticPro 9636P has once again given you professional quality scanning at an affordable price. Comes bundled with imaging and OCR software.



The complete 4-in-1 scanning solution for scanning in slides, negatives, documents and photographs into your PC. With a practical slide and negative-adaptor, superb 36-bit colour depth and 600x1200 dpi resolution, this scanner also comes bundled with a unique collection of image-editing and optical character recognition (OCR) software.

Video & Sound Ca

EAGLE VOODOO II PCI GRAPHIO

...for FOR THE ULTIMATE 2D/3D GAME EXPERIENCE!

- Features: 12MB of high performance EDO RAM
 - Based on 3Dfx Voodoo2 chipset with dual texture engines
 - Full Direct3D hardware acceleration and compatible with 3Dfx Glide titles
 - · SLI(Scan Line Interleave) connector and SVGA loopback cable included
 - . Support any 2D graphics system through a video passthrough connector







FOR BLISTERING PERFORMANCE AT AN AFFORDABLE PRICE!

- Features: Using Intel 740 High Performance chipset
 - Full AGP 1.0 compliant and Full feature AGP 2x Implement
 - . 3D Graphics Enhancements:
 - . Support High-Quality MPEG1 and MPEG2 playback
 - Supports DirectX and OpenGL



S3 Trio3D

...for 3D graphic enhancement!

- Features: Using S3 86C365 3D High Performance Chipset
 - · High performance 3D graphics engine.
 - · Drivers for all major operating systems

4MB 3D FX Voodoo 3D Accelerator \$ 145 2MB S3 Virge 3D PCI VGA Card \$49

4MB S3 Virge 3D PCI VGA Card \$53 ES1938 (SOLO-1) PCI Sound Card \$39



Video & Capture

MiroMedia PCTV is the first multimedia auxiliary card that supports INTEL's Intercast Technology. You can now watch TV (Full screen or scalable window), capture your favourite video, or frame, use Teletext and enhance your web pages all on your PC. Runs on Windows 95/98 & NT.

MIROVIDEO PCTV PRO

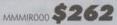
The Miro PCTV Pro has all the features of PVTV plus a built-in FM radio Tuner. You can also listen to TV in full Stereo . together with Intercast Broadcast, Captures videos and listen to CDs or the radio in stereo.



MIROVIDEO DC30 PLUS

The new generation audio/video editing card for PC users. Benefit from miroINSTANT Video software to break the the 2Gb playback barrier, reduce hard drive requirements and speed up production time. Package includes Adobe Premier 5.0, Miro Instant Video, Adobe Photoshop V3 LE and the new Pinnacle Title Deko & Spice Rack. Compression rates up to 7Mb per second, video can be compressed down to 3:1 in PAL. Runs on Windows 95/98 & NT.





MMMIROOS \$365

Sales Notline 02 8344 3190





miroVIDEO PCTV











te ont computers

DIAMOND

Multimedia



Sonic Impact \$90

Hot 3D Wavetable Audio!

Diamond's Sonic Impact S90 uses advanced A3D technology to bring life-like positional 3D game play to your PC. Sonic Impact S90 includes hardware acceleration for 64 wavetable voices and Aureal's A3D to immerse you in the middle of the action. Add realistic atmospheric effects, including fog and underwater sounds, and you have total audio transformation for your PC.

- PCI design for faster system performance
- 64 Hardware wavetable voices
- Supports downloadable samples
- · Runs with DOS, Win95/98, Win NT 4.0



MMDIA010 \$110 RETAIL

MMDIA008 \$59 OEM

Stealth III Series

Latest 3D Technology

The New Generation of Stealth is coming!! With up to a huge 16MB of graphics memory, and AGP 2X/4X power, Diamond's new Stealth III series will deliver cutting edge games and application performance affordable prices.

Piease Call To Ask About **Availability And Price.**

- Features up to 16MB of graphics memory
- Supports resolutions up to 1920 x 1440
- AGP 2X or 4X (depending on model)

www.diamondmm.com.au



Viper V550

Viper V550 from Diamond features unprecedented 128-bit power for the state-of-the-art 2D graphics and stunning 3D quality for high-speed game play, business and professional graphics. Fully optimised for Windows 98, Viper V550 is the next generation in high performance graphics acceleration. Available in PCI and AGP 2X configurations

- Featuring 16MB of SDRAM
- 128-bit dual processor architecture
- Accelerates OpenGL and DirectX
- Supports software DVD

DCDIA016 \$345 PCI

DCDIA018 \$329 AGP

DCDIA017 \$259 AGPOEM



16MB



Monster Sound MX300

Ultimate 3D Audio Experience!!!

Want to annihilate your opponents every time? Diamond's Monster Sound MX300 gives you awesome combat tools: Aureal's latest A3D 2.0 positional audio, 4-speaker support and 64-voice hardware wavetable synthesis. Imagine playing your favourite PC game hearing footsteps from behind you and gun shots from overhead. Monster Sound MX300 delivers unbelievable 3D effects to give you the unfair advantage.



- Hardware A3D 2.0 acceleration
- 9.6 audio systems
- Features Dolby Digital (AC-3) support
- Advanced 320-voice wavetable with support for downloadable samples
- Supports DOS and Windows games

MMDIA011 \$209 RETAIL

NEW MMDIA013 \$149 OFM

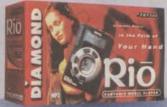
Rio PMP300

Internet Music in the Palm of Your Hand!

The first portable MP3 music player that stores up to 60 minutes of digital quality sound. Load the latest songs on to Rio directly from your Hard Drive, personal CD's or the Internet and carry them with you. It's smaller than an

audio cassette and has no moving parts, so it never skips. Powered by a single AA battery, Rio provides up to 12 hours of continuous music playback.

- Lightweight only 70 grams
- Palm size for easy portability
- 32MB built-in flash memory



MMDIA012 \$446

16MB Flash Memory Card \$139 MMDIA014

Micronics C400

The Ultimate Multimedia Platform



14

Diamond's Micronics C400 motherboard is the perfect platform for your ultimate multimedia system. Featuring Intel's 440BX AGPset, it supports Pentium II and Celeron processor up to 450MHz, Ultra DMA/33, USB and IR communications. For your totally accelerated PC, start with the best!

- - 5 PCI slots (1 shared)

 - Legendary Micronics quality and performance

HomeFree

Easy Wireless Networking!



No holes! No cables! HomeFree delivers 1MB wireless links for up to 16 PCs, 45 meters apart. Includes point-and-click network software for shared Internet access, all at an incredible price. Windows 95/98 only.

- Frequency hopping for maximum security
- 45-metre range
- Each kit contains 2 nodes

· Award BIOS on 1MB flash Desktop to Desktop

NWDIA000

127 York Street Sydney NSW 2000

Desktop to Notebook

NWDIA001



Speakers

NEW

ADA305 Digital PowerCube

The ADA305 Digital PowerCube delivers multidimensional audio excitement resulting from a Dolby Pro Logic decoder in the subwoofer. To deliver the multichannel audio, the Digital PowerCube uses Altec Lansing's patented side-firing speakers so that the audio is driven to the side and rear for a true multidimensional audio experience.

- 20 Watts RMS Satellite Speakers
- 2 x 3" full range drivers
- 6" Subwoofer
- USB ready
- Frequency Response 20Hz 20Khz



ACS45 PowerCube Speaker System

Introducing the Altec Lansing ACS45 PowerCube Speakers, a three piece multimedia audio solution at an unbelievable price. Experience the enhanced output of the PowerCube satellite system. Great for games and CD's, the ACS45 will bring hi-fi audio to your computer desktop today.

- 6 Watts RMS Satellite Speakers
- . 3" full range driver
- . 20 Watts RMS, 6" subwoofer
- frequency response 35Hz 20 Khz

BEST Speaker under \$200

MMALTOO1 \$195



January 1998

ACS48 PowerCube Plus Speaker System

The PowerCube Speaker System, from Altec Lansing is the markets leading affordable audiophile multimedia audio solution for the home or office. Comprising of a 3 unit system, allows you to experience hi-fi quality audio from your CDs, games or the Internet. In addition, the Powercube Plus 6" subwoofer is encased in wood, offering you a deeper low frequency response.

- 20 Watts RMS Satellite Speakers
- . 3" full range driver
- * 3/4" high frequency driver
- . 40 Watts RMS, 6" subwoofer
- · frequency response 35Hz -20 Khz

MMALTO03 \$285

ACS91 Altec Lansing

The ACS91 PowerCube speaker system delivers powerful audio output to suit the home or office computer. Mainting the tradition of audio quality synonymous with Altec Lansing these speakers are now available at an unbelievable price.

- 5 Watts RMS Satellite Speakers
- . 3" full range driver
- frequency response 90Hz 20 Khz

MMALTO00 \$75



///// Saitek



Saitek R4 offers the most advanced racing wheel on the market today. Everything is where it needs to be and the best possible shape - for long hours of gruelling, high octane action. Here at last is a wheel that keeps up with hugely popular driving games of today.



- gellyers generation 3D AL TIES COMPONE
- NVIDIA RIVA TNT
- 16MB High-speed SDRAW Memory
- O AGP 2X or PCI Bus
- 250MHz RAMDAC
- MPEG-1, -2 Playback ingle-pass Trilinear
- Filtering Single pass Multi-texture Processing

staff are available (est) 9am-6pm nical Support (5 Days a w

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Modems

Specifically designed to suit Australian conditions the SwannSmart 56K line of modems bring a hassle free personal fax, data and voice telecommunication centre right to your fingertips!

SwannSmart 56K

The SwannSmart 56K modem brings full communication capabilities to your desktop today. Featuring a download speed of 56Kb/s and Group 3 faxing the SwannSmart 56K is available in both an external & internal version.

- ITU V.90 Standard
- Enhanced ADPCM CODEC for
- *Data Compression rates to 115,200bps
- · Auto Dial & Answer
- · Auto Power Management
- · Answering Machine / Voice Mail
- 5 Year limited warranty





Internal PCI

SwannSmart 56K Global PC Card

Specifically designed to suit conditions almost anywhere in the world the SwannSmart 56K PC-Card brings a complete data communication centre to your laptop computer....anywhere!

- ITS V.90 & 56Kflex Standard
- · Location selection utility automatically configures your modem settings relative to the country's standard
- Phone Cable Adaptor for various countries
- · Countries supported include Australia, UK, USA, Taiwan, HK, Canada, Japan, Germany to name a few





TOLL FREE Customer Support Number 1800 066 336





Spirit 560SP PRO External 56K \$149 HASSPOOT

nternet Voice fox/modern with Speakerphone + SVD external 56k high speed mx/modern that supports the Rockwell KS6Flex standard and popular data & fax standards up to 33,600bps. Hardware based error correction & data compression. Includes Windows fax and communications software with voice mail system, plus

All Modems include:

- 9/25 serial cable and Power supply (ext. model)
- Phone cord (all models)
- Installation instructions & documentation
- · Software: Internet dialler & browser, data terminal emulation software, send receive fax. application and voice mail system



The Spirit Scorpion 56 fax/modern PC Card offers the features of a desktop fax/modern in a small "creditcard" size. Both KFlex and V90. Ready, the Scorpion 56 is a breeze to install and comes supplied with a full compliment of software. This PC Card enables the mobile professional to exchange data faster using a range of notebooks/palmtops running Win 3.1x/95/98/NT/CE



\$75 FMSP1008

VITH AN ADELONG SYSTEM

Multimedia Spirit IV Video Card \$139 MASPIOCO



PCMCIA

Turn your PC into a TV. PCI card that brings full TV reception capabilities to your PC. Features full motion video and "still" capture.



Spirit networking includes a and Hubs in 10, 100 and 1.0/100 configurations.



10/100 PCI NIC NWSPIOD

Modems & PC Car

3COM US Robotics Modem

56K Voice Message Modems

Now your business or home office can have more productive conference calls with the clarity and convenience of a top-quality full-duplex speakerphone - in the same device that brings the full power of the Internet into your desktop computer at

With the V.90 56K Voice Faxmodem and your ordinary analog phone line, you can click through more Web pages in less time. Check out the latest weather maps, hear live audio broadcasts, even see video clips with connect speeds up to 80% faster than with other 28.8 modems.

Enhanced Features:

- Full Duplex Speakerphone
- Stores voice and fax messages even when your PC is switched off
- Make up to 100 documents available to callers with Fax-on-demand
- Remote retrieval of messages through single/multiply mailboxes
- Lifetime Limited Warranty

Professional Modem includes the following extra features:

- One button access to voice mail
- Independent Fax Forwarding. Enables the modem to forward receiving faxes to a pre-specified number

Modem

3COM Megahertz 56K Global

Fax/Modem

- Enjoy high-speed downloads up to 56 Kbps with the V.90 & x2 56K standard
- Simply select a flag or country name to instantly configure your global modem PC Card for use worldwide
- Switch PC Cards without rebooting or exiting Windows
- · Intelligent Auto Install
- Compatible with all notebooks that comply with the PC Card (PCMCIA) standard

3COM Megahertz 10/100 LAN & 56K

Blom U.S. Robotics 56K' Professional Message Modem *1.

FMROB012

Modem



- Enjoy high-speed downloads up to 56 Kbps with the V.90 & x2 56K standard
- Simply select a flag or country name to instantly configure your global modem PC Card for use worldwide
- Switch PC Cards without rebooting or exiting Windows
- Intelligent Auto Install
- Compatible with all notebooks that comply with the PC Card (PCMCIA) standard

HEADSET INCLUDED



Netcomm Roadstar II Ultra 56K

The Roadster II 56 Ultra SVD is a voice/data/fax modem which lets you transmit and receive faxes and data directly from your desktop. It comes bundled with industry leading software enabling you to get started in minutes and of course its speed of 56Kbps makes the Roadster II 56 Ultra SVD very fast. In short, the Roadster II 56 Ultra SVD is a great value package to suit the online gamers, the small office user and the Internet power user. Its ease of use also makes it ideal for the first time user. The USB version goes further eliminating the need for the a power supply.

FMNETO12 \$259 SERIAL

FMNET015 \$275 USB



Netcomm Card Modem 56K



Gives the world traveller the freedom of data connection either through a land line or mobile phone (GSM), with data download speeds of up to a scorching 56,000bps as well as the ability to send and receive faxes of up to 14,400bps. Winfax

> Netcom CardModem 56k+Ethernet

Banksia Wave SP

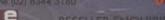


The Wave SP 56 supports both V.90 and K56flex standards to ensure you have no disruptions to your 56K modem connections. A smart answerphone facility provides multiple mailboxes for up to 9 people. Voicemail messages can also be accessed remotely so you don't have to be in the office to receive your

SVD Technology

Full Duplex Speakerphone allows you to use your PC just like a telephone

oles staff are available jest! 9am-épm Manday to Friday, 10am-4pm echnical Support (5 Days a week 9am-épm) Phone (02) 8344-3160



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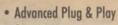




EXCELLENCE THROUGH INNOVATION

Monitors WARRANT YEAR

Mitsubishi Diamond View 1554 15"



· Superior image fidelity 0.28 Dot Pitch

• 13.6" True viewable

 Maximum Resolution 1024x768 up to 65Hz

\$325 MOMITO03



Mitsubishi Diamond View 1772E 17"

- · Advanced PnP compatibility
- . 15.9" True Viewable
- · Maximum Resolution: 1280x1024 up to 60Hz
- · Superior image fidelity 0.27Dot Pitch

\$595 MOMITO02



Diamond Plus 72 Diamondtron 17"



0.25mm Dot Pitch

High-contrast, flat-square CRT with anti-reflection, anti-glare, and anti-static

16" Maximum viewable

Max Resolution 1600 x 1200 at 65Hz

OSD Contrast, 15 pin mini D-Sub & Apple Maantosh Signal Adaptor Induded

Mitsubishi Diamond Plus 71 17"

- DIAMONDTRON Monitor. with the super-fine aperture arille pitch of 0.25mm Dot Pitch
- 16.0" True viewable Maximum Resolution
- 1280x1024 up to 65Hz

AL \$695 MOMITOON



Diamond View 1995 197

- · High contrast 19" picture tube with 18" viewable.
- 5 user selectable and adjustable colour temperatures.
- · Flicker free high-resolution images 1600 x 1200 pixels at 75 Hz refresh rate.

1225 MOMITO05

Diamond View 2107 21"

- · 0.26mm Dot Pitch
- 20" Viewable High Contrast Flat Screen
- Max Resolution 1600 x 1200 at 80Hz
- . OSD Contrast, 15 pin & BNC output
- · Excellent Choice for CAD, Design and multimedia applications

2095 MOMITO06



Storage

The new standard in diskette storage. Code Price Mitsubishi Diamond Data 36X CD-ROM Mitsubishi Diamond Data 40X CD-ROM \$95 \$105 MMMIT003 MMMITD01 Model Code Mitsubishi LS - 120 - 120MB Capacity. \$169 BUMITO00. Mitsubishi LS-120 FACTS: *Large storage capacity of 120MB in a single LS-120 diskette. • 100% compatibility with existing 3.5" diskette media 120MB capacity diskettes to suit LS - 120 Drive BUMIT001 \$25 Code Price

Mitsubishi Diamond Data 1.44MB Floppy disk drive

Keyboards

Mitsubishi Diamond Touch **Ergonomic Keyboard** \$49 IOMITOO1

Mitsubishi Diamond Touch **Economical Keyboard**

\$30 IOMITOOD



\$36



FDMIT000

Monitors

Panasonic

Panasonic's NEW Digital technology sets the standards for Top performing high-end monitors. All monitors feature truetype colours, excellent focus and convergence, power saving functions and crystal clarity in colour display.

PanaFlat LC50

15" colour monitor with state-of-theart design creating a slim profile.

Specifications

- *15" flat screen monitor
- . 0.297mm dot pitch
- Built in Multimedia Speakers
- On-Screen display controls
- -1024x768 max.res.
- * 15" viewable area



\$2299 MOPANO13





PanaSync SL70

17" Digital Multiscan colour FST display. The monitor that's very sharp and compact in size.

Specifications

- 17" flat screen monitor
- * 0.27mm dot pitch
- *Advanced anti-glare, anti-static coating
- * On-Screen display controls
- 1280x1024 at 65Hz.
- 16" viewable area

\$785 MOPANOO3



PanaSync E70 17"

\$645 000000

PanaSync" E50i 15"

\$345

PanaSync SL90

19" monitor with a large 18" true viewable area. Super sharp and compact in size.

Specifications

- *19" flat screen monitor
- *0.25mm dot pitch
- · Advanced anti-glare, anti-static coating
- *On-Screen display controls
- *1600x1200 max.res. at 75Hz
- * 18" viewable area

\$1375 MOPANO11



PanaSync S110

The 21" monitor that takes brightness to a new level and places its focus on high image quality.

Specifications

- *21" flat screen monitor
 - * 0.25mm dot pitch
- Anti-glare, anti-static coating
 - On-Screen display controls • 1600x1200 max.res.
 - 20" viewable area

\$2135 MOPANOOT

Monitors

Videocom

Model	17"DC-770BA	17"DC-770LAT	19" DA-995
Screen Size	16" Viewable	16" Viewable	18"Viewable
Dot Pitch	0.27mm	0.25mm	0.25mm \$495
Max Resolution	1280 x 1024 N/I	1280 x 1024 N/I	1600 x 1200 N/I
User Control	OSD	OSD	OSD
Price	\$495 MOVIDO00	\$575 MOVID002	\$949 MOVID001 SPECIAL
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Teac 12x4 CD Recorder

The new CD-R55S from TEAC offers all the advantages of true 4X write performance. It takes just fifteen minutes to create a typical 650MB CD only half the time of a 2X writer. This means you'll spend less time burning

discs and more time creating



SCSI retail kit includes Adaptec SCSI card, cables and CD-R software and media.

MMTEA004 **\$599** Retail Kit

Panasonic DVD Kit

DVD technology brings a whopping 8 GB of data per disk to your desktop today. Watch the latest DVD titles or play the latest multimedia and games with the Panasonic DVD kit.



MMPANOOS \$275 (DVD DRIVE)

Panasonic 8x4x CD-Recorder

Reliability with this 4x recorder. This Panasonic recorder will also read at a sustained 8x rate. The kit includes recording software and a PCI SCSI card. Everything you need to get up and running.

CD-Recordable Drive Kit, 4-speed write/8-speed read bundles with software & SCSI interface



Panasonic LS-120 Drive

This drive will read and write the new LS-120 super floppy disk. It also can read/write existing 1.44Mb 3.5" floppy disk. This drive uses the ATAPI interface and is bootable with a current BIOS.

- Lage storage cap. of 120MB in a single LS-120 diskette
- 100% compact, with existing 3.5" diskette media
- . Bootable with BIOS

BUPAN000 \$169

LS-120 Disk BUIM001 **\$25**

32x CDROM Drive

The all new CD-532 series of 32X CD-ROM drives provide the ultimate in playback performance. They benefit from CAV technology that optimizes the data rate by rotating the disc at a constant speed.

Available in both SCSI & ATAPI interfaces.

Drives

MMTEA001 \$99 ATAPI IDE MMTEA003 \$189 SCSI



Panasonic 32x/24x SCSI CD-ROM

Panasonic 32x CD-Rom

This internal ATAPI 32X lets you transfer data and load applications faster than ever, Super fast performance for games and multimedia applications. Compatible with Windows 95/98, Windows 3.1/3.11, NT 3.5 and Higher, and OS/2 Warp. Maximum Transfer Rate 5472 Kbytes/sec and fast access time of 65ms.

.ai

Panasonic 24x SCSI CD-Rom

Internal SCSI CD-ROM Drive Fast 24 speed mechanism 85 msec access time. Max Data Transfer Rate 4,104 KB/sec and large 512 KB Buffer. Perfect for continuous high speed transfer. Compatibility with all major operating systems.

MMPAN001 \$169

CTX

Projector

The CTX range of EZPro Projectors bring ease and portability to making professional presentations.

Connect them to sources such as PCs, MAC & video sources.



EzPro 585

- · Lightweight only 10 pounds S
- TRUE 800 x 600 SVGA
- Compatible with MAC, PC & Video source
- · 500ANSI lumens brightness
- Comes with remote & Carry

\$5995

MMCTX003

EzPro 500

- . 6.4" colour TFT LCD Panel
- 16.7" million colours
- 350 ANSI lumens
- 640 x 480
- 400 Watt lamp
- · Speaker

\$3525 MMCTX000

Call for lease options!



MMPAN002

CD R/RW Drives RIGOR



A single drive that does it all. Reads, writes, Rewrites CD data. The Ricoh MP7040 series drives have multi-function capabilities so they can efficiently handle any CD-based media from the world's first re-writable CD, Ricoh's CD-RW, to the write-once CD-R and CD-Rom. With just one drive, you can always

ReWrite 20xRead

MP6200AR (EIDE) ATAPI

MMRIC001

\$599 Kit includes \$35 of Media products

6x Read, 2x Rewrite

Easy and simple • 2MB data buffer memory just like a floppy

- · 4x Recording 4x Rewriting & 20x Reading
- . Drag & Drop operation just like a floppy disk
- · For data distribution, back up and creating original CDs

- · Complete package including everything to start writing CD-R/RW
- Adaptec Direct 2.5, Easy CD Creator software

choose the perfect media to suit your applications.

120ms access time

Now supporting random access writing.

Ricoh CD-R Disc 74 Mins 650Mb

Information stored on computers and distributed via the computer network is of vital importance for a small business. MGE UPS SYSTEMS is the first UPS manufacturer to design a range of UPS that meet the specific requirements and restrictions of small business staff and management: the price is reasonable and the package is easy to install and use.

BENDONS!

	ES2+	ES5+	ES8+	ES11+
Power	220VA	480VA	780VA	1080VA
No DF power output	2	2	4	4
Fax/Modem line		STATE OF THE PARTY OF	V	/
The state of the s				
Backup time for PC	5 min	23 min	44 min	78 min

ES + series for a total and manageable protection system Plug and Play compatible, the solution - PAC 97-power management software games a powerful GUI interface to control features such as remove management and shutdown of multiply service.



	EL2	EL4	EL7
Power	220VA	450VA	750VA
No of power outputs	2	2	4
Fax/Modem Line			V
Backup time for a PC	5 min	20 min	40 min
Price	\$259	\$335	\$Call

Perfect for the Soho, the EL Series offers affordable protection for your equipment.

Power Filter

Computer and equipment protection!

Protect your expensive PC equipment with these power filters Provides protection against Surges and Spikes, EMI and RFI noises

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(SE)	200	100	700		-

Model

ZAPTRAP - Four individually wired sockets ZAPCATCHER - Telacom Line protection

Price \$140 \$150





rotection For

- · Fax Switch
- EFTPOS Terminal



Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Technical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160













Great for starters, the Zip Starter Kit contains a 100MB Parallel ZIP Drive & 4 coloured 100MB

disks. An excellent choice for backing up or sharing data with others. Best of all the Zip Drive is portable and can be used





Increase your storage quickly, easily and economically - as you need it. With a 100MB Zip Drive you can take your data anywhere at anytime. Each disk stores 100MB of data and you can add them, as your needs grow. Available in Parallel, SCSI and Internal IDE.



For USB equipped PCs & iMACs comes the new 100MB USB ZIP Drive. Easy to install and use the USB ZIP Drive and be



Card ...for notebooks

The Zip Card is a PCMCIA to SCSI adaptor card that allows you to use your SCSI ZIP Drive on a notebook computer. Easy and portable solution.



Accessories

BUIOM012 100MB PC ZIP Disk \$23 BUIOM005 100MB PC ZIP Disk (3 Pack) \$63 100MB PC ZIP Disk (10 Pack) BUIOM006 \$190 BUIOM015 ZIP ZOOM SCSI Card \$55



are fast and backwards compatible with the industry standard

1GB disk. Stream & capture video, backup data and store images are just some of the applications that the Jaz Drive can be used for. SCSI Card needed





Jaz Traveller is a SCSI to parallel port converter. Attach your Jaz Drive to a parallel port on any PC or notebook. Excellent for those who need to exchange data with their Jaz Drive.



Accessories

BUIOM024 JAZ 2GB Disk BUIOM025 JAZ 2GB Disk (3 Pack) \$559 **BUIOM031** JAZ PCMCIA to SCSI Converter

Jaz 2GB Drive with **Jaz Traveller**

For a short time, the JAZ 2GB Drive is bundled with the JAZ Traveller at a special discounted price.

With this combination, you can use your JAZ Drive anywhere. No longer do you have to look for SCSI connection as the JAZ Traveller lets you connect your JAZ Drive to any PCs parallel port. Best of all you get a whopping 2GB with each disk.

lomeg

All the hardware and software you need to be a video genius Introducing the Iomega

Buz-the easiest way to get multimedia from camcorders, DVD, CD-Roms, VCRs and laserdiscs into your PCI It's a video capture and editing board combined with an Ultra SCSI controller that lets you capture Multimedia (fullmotion) video, sounds, digital pictures, music) into a PC





Available in Mac format





Backup your data with the best in the business. We now carry a Full range of Tape and DAT backup systems from Seagate.

Cost effective, Entry Level internal storage for Desktop applications, Servers and High-End Workstations. Kits Includes Seagate Backup Exec Windows 98 Version 3

Seagate Backup Exec Desktop 98 provides a powerful feature-set with the easiest-to-use interface for reliable, automated Windows 98 and Windows 95 data protection. Integrated Emergency Recovery feature rebuilds your entire system without reinstalling the operating system or the backup software. Selectively locate files with the File Find feature for specific data restores.

Hodal	STT28000N-RFT	STT28000A-RFT
Cepadity	8Gb	8Gh
Form Factor/ Interface/ Stendard	5.25"/3.5" H/H SCSI, Travan TR4, Tape Kit	5.25"/3.5" H/H EIDE, Travan TR4, Tape Kit
Inclusions	Seagate Backup Exec, Tape	Seagate Backup Exec, Tape
Price	\$595 BUSEA001	\$525 BUSEA000

Highest Performance and Capacity, Low Cost, Multigigabyte Data Protection for High-End Servers and Workstations Kits Includes Windows NT Workstation Version 2

Seagate Backup Exec is comprehensive, easy to use, 32-bit data protection for Windows NT Workstations 4.0. Built-in device detection automates setup and the simple push of a button launches backups or restores. It reliably protects NetWare data, including Bindery and Trustee Information as well as guarantees consistent and reliable unattended backups with advanced Scheduling and the AutoProtect feature.

Model	STD28000N-RFT	STD68000A-RFT
Capacity	8Gb	8Gb
Form Sector/ Interface/ Stendard	Internal - 3.5" / 5.25" SCSI, DDS-2 DAT tape drive.	External - 3.5" / 5.25" SCSI, DDS-2 DAT tape drive.
Inclusions	Single Server, Backup Exec S/W for NT and Netware, 2 Tapes	Single Server, Backup Exec S/W for NT and Netware, 2 Tapes
Price	\$2025 BUSEA002	\$2345 BUSEA003



All Seagate Backup systems comes with award winning software





Networkin

NETGEAR

Analogue Router + 56K Modem

COMPLETE SOLUTION FOR SOHO INTERNET ACCESS

Share Internet access with your small office/home users with the RM356 Analogue Router. Using a single ISP account and phone line users can now check email, browse the Internet & download information simultaneously. Connect up to 4

computers to the RM356 or connect the RM356 to your hub for unlimited connections.

- · Built in 56K V.90 modern and integrated 4 nort hub
- . Supports Dynamic IP, DHCP, NAT, PPP

\$615 NWNGR107



RT 328 ISDN Router

The NETGEAR RT328 ISDN Router provides Internet access, LAN-to-LAN Intranet connection, and remote access for a single user, a small business, or a branch office over ISDN. The RT328 combines the latest in networking technology, found only in high-priced business models, with ease-of-use designs and a price affordable office.

- . Dynamic NAT enables entire workgroup to share an Internet Connection
- . Supports PPP& 128Kb MutliLink PPP, TCP/IP, RIP, CHAP
- · Firewall Security & Control, Caliback
- Simple configuration with Windows GUI or Telnet

. Use DHCP to assign addresses for IP. Gateway, DNS for LAN



\$715

Ethernet Hubs

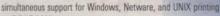
Choose from a range of 10Mbps and 100Mbps Ethernet Hubs



I	Code	Description	10Mbps	100Mbps	Rackmount	Price
I	NWNGR007	EN116AU 16 Port Hub with BNC	V			\$215
ıf	NWNGR012	ED516AU 16 Port Hub with BNC	V		V	\$295
li	NWNGR013	EN516AU 24 Port Hub with BNC	V		V	\$415
lì	NWNGR014	DS108AU 8 Port Dual Speed Hub	V	V		\$435
		DS516AU 16 Port Dual Speed Hub	V	V		\$1175
		DS524AU 24 Port Dual Speed Hub		V		\$1615

NETGEAR Print Servers

NETGEAR print servers enable you to connect printers to the network for sharing among multiple PCs. Compared to attaching a printer to your PC, the print server gives more cost effectiveness, better performance, and



Perfect for the SOHO user the PS104 supports 1 Parallel printer and up to 4 PCs via its built 4-port 10Mbps Ethernet hub. Connect the PS104AU to a hub for unlimited connections.

\$315 NWNGROOD Connect up to 2 Parallel printers to the PS110AU. Attach the PS110AU to any 10/100Mbps

Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Technical Support (5 Days a week 9am-6pm) Phone (02) 8344-3160

Salas Hotline 02 8344 3190











D-Link

Networking

Ethernet NICs



\$56 NWDLI002

Ensure your future network upgrades are catered for with enthusiast looking to set up a this 10/100 auto-negotiating network adapter. Plug & Play support for trouble free installation.



The ideal kit for beginners or network. Includes 2 x 10Mbps Network cards, 2 x 7m CAT 5 cable & a 5 Port hub for future expansion.

Item Code	Model	Bus	Speed	Price
NWDLI000	DE-220PCT	ISA	10Mbps	\$35
NWDLI001	DE-528CT	PCI	10Mbps	\$40
NWDLI026	DE-500TX	PCI	10/100Mbps	\$85

Ethernet & Modem PC-Cards



DMF-560TX PCMCIA 10/100Mb LAN & 56 Modem PC Card.

- V.90 K56 Flex Fax/Data/Modem.
- Compatible with 10 & 100Mbps Networks

Item Code	Model	Description	Price
NWDLI003	DE-660CT	10Mbps PCMCIA Ethernet Card	\$110
NWDLI013	DFE-650TX	10/100Mbps PCMCIA card	\$225

Print Servers



Turn any printer into a network printer through D-Link's range of print servers. Just plug in your printer and connect the print server to your Network hub via Ethernet. Compatible with Win NT/ 95/ 98, UNIX, TCP/IP, NetBEUI, IPX & Appletalk Protocols. 10/100Mbps Enabled

Item Code	Model	Printers Supported	Price
NWDLI015	DP-300	2 x Parallel, 1 x Mb	\$429
NWDLI023	DP-101	1 x Parallel, 10Mbps	\$275

Fax/Modems



D-Link's range of Fax/Modems are V.90 &K56 Flex compatible utilising the high performance Rockwell chipset.

INTERNAL

Item Code	Model	Description	Price
FMDLI000	DFM-5601	56K Internal Modem	\$135
FMDLI001	DFM-560E	56K External Modern	\$165
FMDLI002	DFM-MAC	MAC connectivity kit with software, cables for 560E	\$49

Internet Servers



The DP-602 makes connecting your LAN to the Internet easy than ever by sharing one ISP Account with all users. Features include NAT, Dial-on-demand, DHCP and PPP. Support for both analogue modems and BRI ISDN T/A the DP-602 also allows the use of both COM ports for double bandwidth.

\$495 NWDLI027

Ethernet & Fast Ethernet Hubs

D-Link's range of hubs provide easy connectivity options for Ethernet users as well as a cost effective way to upgrade to Fast Ethernet networks.

10Mbps Ethernet Hubs

Item Code	Model	Ports	BNC / AUI	Price
NWDL017	DE-805TP	5 UTP		\$99
NWDL004	DE-809TC	8 UTP	BNC	\$149
NWDLI028	DE-809TP	9 UTP		\$149
NWDLI029	DE-810TAC	8 UTP	V	\$269
NWDLI005	DE-816TP*	16 UTP	V	\$325
NWDLI030	DE-824TP*	24 UTP	V	\$485

100Mbps Fast Ethernet Hubs

Item Code	Model	Ports	Price
NWDL031	DFE-816STX	16	\$1095

10/100Mbps Nway Dual Speed Hubs

These Dual Speed Hubs provide a network that is compatible with a mixture of 10Mbps & 100Mbps users.

Item Code	Model	Ports	Stackable	Price
NWDLI027	DFE-904	4		\$226
NWDLI012	DFE-908X	8	V	\$735
NWDLI014	DFE-916DX	16	V	\$1195
NWDLI020	DFE-2624X*	24	V	\$2025

^{*}Rackmount 19"

Ethernet & Fast Ethernet Switches



For a cost effective solution aimed at reducing network congestion look to D-Link's range of switches for improving network performance.

DES-1008 8x10/100NWAY

\$1645 NWDLI022

Item Code	Model	Ports	10Mbps	100Mbps	Price
NWDLI011	DES-810	10	8	2	\$859
NWDLI021	DES-815	15	12	3	\$1195
NWDLI032	DES-1016	16	V	V	\$2121
NWDLI022	DES-1008	8	V	V	\$1645





BJC-50 PRCANO20 \$585

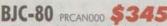
• Half the size of the BJC-80 but not half

- the performance.
- Featuring a InfraRed Port and Lithiumion Battery which is good for 100 A4 prints. Maximum resolution of 720dpi at up

Snap in the optional scanner head for 360dpi full colour scanning.

> PRCAN001 \$137 Scanner head

PORTABLE



 Drop Modulation Technology - the dual drop size breakthrough that produces smoother colour gradations.

Office laser quality finish & B&W speeds up to 5 pages per min. with dedicated black cartridge.

 Windows® 95 compatible IrDA infrared port for cable-less communications.

> PRCAN001 \$137 Scanner head



BJC-4310SP PRCAN021 \$209

NEW IMPROVED SUPER ECONOMY MODE

- drop modulation technology uses dual drop sizes for smoother colour graduations with standard and photo realism inks.
- optional photorealism inks for photo gold standard printing.
- speed black cartridge prints up to 4.5 pages / minute.



BJC-255SP PRCAN017 \$ 145

- Super Economy mode for colour and
- New high capacity black cartridge 20% more ink, no extra cost.
- Up to 5 times the output of direct competitors.



BJC-5000 PRCANO22 \$523

- 1440 dpi resolution for photographic reproduction
- A3 capable via manual feed
- 7 colour photo inks
- The dual cartridges print up to 7.5 pages per minute in black and up to 3 pages per minute in colour.
- 130 Page sheet feeder



BJC-7100 PRCANO12 \$523

- 8ppm Black and 5ppm colour
- 7-colour ink system and 9 saturation incredibly rich photographic half-tones.
- P-POP (Plain Paper Optimised Printing) gives plain paper a coated paper quality finish.
- 130 Page sheet feeder



LBP-660 PRCANDIT \$515

DROF

- High Speed 6ppm engine
- . 600 DPI for quality to rival its more expensive competitors
- 100 sheets automatic feeder
- Windows Printing System and PCL4.





FB620P IOCANO03 \$265

It takes up less desktop real estate than any other colour flatbed scanner on the planet yet still delivers exceptional 600 dpi scanning.

- Optical Resolution 600 dpi
 Maximum Resolution 2400 dpi x 2400dpi
- 30 bit Colour

PowerShot A5 IOCANO04 \$975

 The new Canon PowerShots A5 is everything you've always wanted from a digital camera. In fact, it's the smallest digital camera ever engineered with 1024 x 768 (XGA)

resolution. · Complementing its ultrasensitive, high resolution CCD, the PowerShot A5 comes with a highquality, low-distortion, allglass lens, ensuring consistently sharp images. Plus, the unique Stitch Assist

mode makes it easy to create dramatic panoramas.



CALL FOR COMPLETE RANGE OF CANON INKS AND CONSUMABLES

Sales staff are available (est) 9am-ápm Monday to Technical Support (5 Days a week Pam-6pm) Phone (02) 8344-3160















HEWLETT PACKARD

Printers

HP LaserJet



HP LaserJet 1100

\$799

Excellent for the home or small office, the HP 1100 produces stunning results whilst offering expandability and excellent value for money. JetPath technology allows you to upgrade the HP 1100 to include a scanner at any time.

Item Code Description

new \$1425

HP LaserJet 2100

Introducing the latest HP 2100 series of LaserJet printers. Great for workgroup computing the HP 2100 features a print resolution of 1200dpi, 10ppm output, 350-sheet feeder & a monthly print cycle of 15,000 pages.

Item Code Description PRHPDO48 2100M with 8MB RAM, Postscript

\$2265 **HP LaserJet 4000**

For departmental printing where speed is a must, look no further than the HP 4000 Laserlet. Featuring a 100Mhz RISC processor which outputs 17ppm at 1200dpi the HP 4000 also comprises a 500 sheet input tray. Warm up fime is a mere 15 seconds. Postscript L2 & PCL supported.

\$1595 Item Code Description

PRHPD046 1100A with Printer, Copier, Scanner - All in one \$965 PRHPD049 2100TN with 8MB RAM, Network ready, Ps. \$1925 PRHPD050 Loseder 5000, 16ppm, 1200dpi Postscript, A3 \$2945

HP DeskJet



HP Deskjet 695

Featuring the latest in colour printing technology with Colour Smart II. Easy to use & install the Deskjet 695 will output 5ppm in black or 1,7ppm in colour at 600dpi.



HP Deskjet 710C

Want photo quality printing that wont cost the earth. Then the HP 710C is your ideal partner. Print black at 6ppm and colour at a staggering 3ppm. This stylish yet practical printer will handle a variety of papers including envelopes & cards.



Super-fast printing and stunning results on plain paper is what to expect from the new HP 880C. Your black text will look more laser like than every before while your calour prints will bring life to your documents & images. The HP 880C is no slouch either. Output is rated at 8ppm in black & 2ppm in colour. USB and Parallel interface.

HP All-in-one



HP OfficeJet 635

The Officelet 635 is an integrated fax, Colour printer, colour copier & colour scanner - all in one.

Print: 600dpi at 5ppm in black & 2ppm in colour Fax: Plain paper fax & 20 page document feeder 1200dpi enhanced with OCR software Copy: Resizable colour copying or B&W copies

independent of the PC



HP OfficeJet 710

With the Officejet 710 you can communicate with the world completely in colour! Send and receive colour faxes with other colour fax machines as well as printing, scanning and copying in colour. In addition communicate with others over email using the colour scan-to-email feature

600dpi at 5ppm in black & 2ppm in colour Plain paper fax & 20 page document feeder in colour

1200dpi enhanced with OCR software

Resizable colour copying or B&W copies independent of the PC



HP OfficeJet Pro 1170C

The easy to use All-in-one that will produces professional results for the corporate user. The HP 1170C features a versatile flatbed that lets you scan and copy books, posters, brochures and various other media.

Print: 600dpi at 9ppm in black & 5ppm in colour

Fax: Plain paper fax

1200dpi enhanced with OCR software

Resizable colour copying or B&W copies

independent of the PC. Superzoom, auto enlarge and clone features.

26

CITY OFFICE 127 York Street Sydney NSW 2000 Ph: [02] 9267 5272 Fox: (02) 9267 5042



Printers

EPSON



STYLUS COL. 740

EPSON Stylus 740 is targeted at business/corporate and professional graphics users. Designed for both Microsoft and Macintosh, the EPSON Stylus COLOUR 740 also features optional network connectivity. Printing at 1440 x 720 DPI and a maximum of 7ppm the Stylus 740 eclipses many desktop laser printers whilst providing unrivaled photo reproduction

\$495 PREPSO21

STYLUS PHOTO EX A3

The Epson Stylus Photo EX is the perfect printer for photo reproduction, pre-proof graphics. Industry-leading 1440dpi resolution with a sixcolour ink system and A3 paper handling.

\$769 PREPSOTS

FREE

EPSON STYLUS COLOUR 440



The EPSON Stylus COLOUR 440 is a remarkable new printer that produces dazzling, photo-quality right out-of-thebox! The EPSON Stylus COLOUR 400 features photo-quality output with print resolutions of up to 720 x 720 dpi on plain

\$245 PREPSATO

STYLUS COL. 640



1440X720 DPI, 3PPM, With its remarkable 1440 x 720 dpi capability, the Epson Stylus COLOUR 640 sets a new standard for cost-efficient, photo-quality colour printing without the need for expensive

\$320 PREPS020

STYLUS PHOTO 700



The Epson Stylus Photo 700's dazzling Photo Reproduction Quality output is made possible by a six-colour ink system. It offers the Highest image quality of any home user ink jet printer available today.

\$429 PREPSO11

Scanners

Astra 1220 series - Includes Adobe PhotoDeluxe

The Affordable 36 bit professional scanning solution

The Astra 1220 series was designed specifically corporate or small office users who want something more from their scanner. Built with a 36 bit colour CCD, the Astra

1220 captures an amazing 68.7 billion colours to bring all your images to life. A complete range of easy to use software is included with the 1220, making it a versatile tool for any user. Perform OCR with astonishing accuracy or scan images to add a splash of colour to your documents. The opportunities are endless with the UMAX Astra 1220.

122OS \$495 IOUMADOS

1220U \$345 OUMADO

• 1200 x 600dpl optical resolution for crisp, vibrant

• 9600dpi max. resolution for smooth lineart & image magnification

. A 36 bit colour depth captures 68.7 billion colours

A4 scanning area (216 x 297mm)

Single pass colour CCD for fast, productive

PARALLEL 1220P \$279 JOUNADO

Astra 610 series

The compact plug 'n' play colour scanner for home and office users

Add the colour and vitality of images to everything you do on your computer with a new Astra 610 series scanner. After plugging it in and installing the software, simply press the 'on' button at the front of the scanner and you're ready to go - it's that easy!

- 600 x 300dpi optical resolution for crisp, vibrant images
- 4800dpi max. resolution for smooth lineart & image magnification
- · Captures over 1 billion colours through 30 bit scanning

610P \$ 1 45 KOUMA002

PARALLEL

- A4 scanning area (216 x 297mm)
- · Single pass colour CCD for fast, productive scanning
- Extensive software package handles all your creative and scanning needs

610S \$279 10UMADOS

SCSI

interface TIG THE

echnical Support (5 Days a week 9am-6pm) Phone (02) 8344 3160

Sales Holline 02 8344 3190

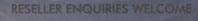












Digital Cameras

Kodak's new digital cameras boast high resolution and great features.

Kodak DC200plus

The KODAK DC210plus Digital Camera gives you the power to capture amazing, high quality images (1152 x 864) with vivid colour and enough dazzling detail for photo-realistic 5" x 7"prints. With a focus-free lens, autoexposure and white balance, easy-to-use graphic interface and mode dial, built-in flash with red eye reduction,

self-timer and all the ease of a pocket-sized, point-and-shoot camera, you won't miss a single, sensational shot. The DC200plus camera also comes with a 8Mb picture card for removable storage of up to 120 pictures. Instantly review your images on the integrated, colour LCD display to keep just the shots you want. Then, simply drag-and-drop images from the camera right into popular, computer software applications or

Kodak DC210plus

view (PAL/NTSC) images on TV.

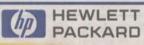
The DC210 Plus is the most advanced, most affordable and easiest-to-use digital camera in its class. It delivers spectacular detail, colour, and sharpness thanks to megapixel technology (1152 x 864) and a 2X wide-angle zoom lens, equivalent to 29-58 mm on a 35 mm camera. The

DC210 Plus also has the user-friendly features you want, including greater storage capacity with an 8 MB Picture Card, the Date Stamp option to add the date to each picture's digital file, and an AC adapter right in the box. The colour LCD allows you to review/preview pictures instantly so you know you've got the shot you wanted. We've taken the award-winning, highly successful DC210 Zoom Digital Camera and made it even better!

10KGD002 \$ 1 395

Kodak DC240

The latest from the Kodak range, supports serial and USB transfer, Featuring 1.3 million pixels (1280x960), this is the highest resolution comera from Kodak. Features an auto focus 3x zoom lens and 1.8" TFT screen. This camera is designed for ease of use and superior image performance. Everything you need is included in the kit, 4x AA Nimh batteries and charger, 8Mb Compact Flash card and all the software needed. All serial and USB cables are included, even a TV output cable is included so you can preview your images on a television. For the latest in digital imaging, this camera is the one to get.



HP Scanlet 3200C

The new HP Scanlet 3200C colour scanner is HP's most affordable scanner. It features high optical resolution of 600 dots per inch and ease of use via HP's Intelligent Scanning Technology, Simple Parallel Port connection means no hassles installation and setup.

Specifications:

- · Connectivity: Parallel Port Pass through
- * Colour: Colour & Monochrome
- . Resolution: 600 dots per inch, 9600 dots per inch enhanced
- · Colour: 30-bit
- · HP's PrecisionScan LT

ЮАНДО20 \$ 195



HP Scanlet 5200C

The HP Scanlet 5200C colour scanner is the only scanner that simultaneously scans and optimizes photos, text, and line art. HP's exclusive Intelligent Scanning Technology makes scanning easy for everyone. Scan an entire page 2-3 times faster than with other scanners!

Specifications:

- . Connectivity: USB and Parallel Port Pass through
- * Colour Colour & Monochrome
- . Resolution: 600 dots per inch Hardware Super Sampling, 9600 dots per inch
- . Colour: 36-bit
- · MP's PrecisionScan



HP Scanlet 4200C

The new HP Scanlet 4200C colour scanner is designed to simplify colour scanning. With push-button scanning and push-button colour copying, anyone can get great results with the HP Scanlet 4200C. The Universal Serial Bus (USB) means effortless, trouble-free installation and use. All at a truly affordable price.

Specifications:

- Connectivity: Conflict-Free USB
- Colour: Colour & Monochrome
- Resolution: 600 dots per inch Hardware Super Sampling, 9600 dots per inch enhanced
- Colour: 36-bit
- HP's PrecisionScan LT

IOAHD021 \$385

HP Scanlet 6200C

Productivity means completing your task quickly -with the quality you need. With the HP Scanfet 6200C Professional Series colour scanner, you can be up to 4 times more productive than with comparable scanners.

Specifications:

- Connectivity: USB and SCSI (SCSI card and Cable not supplied)
- Colour, Colour & Monochrome
- Resolution: 1200 dots per inch Hardware Super Sampling, unlimited enhanced resolution
- Colour: 36-bit

* HP's PrecisionScan Pro IOAHDO14 \$765



Video conference and send images or movies over the internet CD-Rom full of editing, capturing, and emailing pictures and videos included.



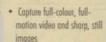
Logitech* UICKCAM VC

- . Capture still images and video clips in colour
- . Easy to install and use
- · USB or parallel port versions
- · Works with Windows 95 and Window 98

Logitech QuickCam VC is the affordable videoconferencing solution that brings the excitement, immediacy, and expressiveness of videa communications to your desktop.

PARALLEL \$170

Logitech* QUICK CAM HOME



- . Build-in microphone for natural communication
- · Plug & play USB/Window
- · 320x240 at 25fps capture

. 640x420 still image capture Logitech QuickCam Hame was designed with comcorder technology and advanced compression to deliver sharp still images, and enhance video quality at up to 30 frames per second.

\$265

Logitech^e UICKCAM PRO

- · Larger, more vibrant pictures
- . Videoconferencing, video e-mail, web pages and
 - . Tilt/swivel base with built-in damp
 - . Parallel and USB compatible The Logitech QuickCom Pro captures image at a true 640 x 480 resolution. That's 3 times the resolution of standard 352x288 size

cameras, QucikCam Pro also captures in 30-bit colour,

PARALLEL \$279

CONVENIENT HYPERJUMP AND CYBERJUMP FEATURES

You can also assign a button for Logitech's Hyperjump and Cyberjump features, in Window 95/98. Hyperjump moves eight frequently-used Windows 95 commands included open, close, resize and minimize directly to your curso. Cyberjump gives you instant one-click access to eight popular Web surfing commands, including create a bookmark, go to a bookmark, move back a page, and more.

FIRST MOUSE+

YOUR BEST VALUE ON A ZOOMING/SCROLLING MOUSE

Logitech First Mouse + gives you the advantage of Logitech's unique wheel button in a comfortable mouse you can use with either hand. Use the wheel button as both a fully-functional mouse wheel for scrolling and zooming and a third, customizable, mouse button.In addition to scroll and zoom, MouseWare software makes it simple to customize First Mouse + buttons with one-click commands.

10LOG007 **S49**



DESIGNED FOR PERFORMANCE AND COMFORT

MouseMan+ was designed with humans in mind. Textured grip make it easy to hold and use. In addition to the handy thumb button, three buttons on top fall under your fingers for easy clicking and using the wheel. Logictech MouseMan+ combines an innovative new design with a wheel button that lets you work better in all your Windows 95/98 applications.

10LOG008 \$95

THE ADVANTAGE OF OPTICAL MARBLE SENSING TECHNOLOGY

Patented, optical Marble sensing technology eliminates the moving parts of mechanical trackballs. A laser-like beam illuminates dots printed on the ball, while an optical sensor tracks the motion. This gives you precision, reduces wear, and ensures smooth tracking, even if the ball gets dirty or scratched.

MARBLE MOUSE+

FITS YOUR HAND LIKE A MOUSE, WORKS LIKE A TRACKBALL

Logic Marble Mouse brings together the unmatched precision of Marble technology with the fit you love in a mouse and the convenience of a trackball. This innovative mouse provides comfortable curves while letting you move on-screen by simply rotating your desk. Comfort and control for left and right hands.

10LOG009 \$89

TRACKMAN MARBLE+ THUMB-OPERATED

SCROLL AND ZOOM WITH MARBLE PERFORMANCE

NEVER USE SCROLL BARS AGAIN

With the scrolling wheel, you can scroll from whenever your cursor rests in any Windows 95/98, Windows NT 4.0, or Internet application without having to move over to the scroll bars. Award-winning MouseWare software makes it simple to personalize your performance by assigning one-click commands to the TrackMan Marble + buttons.

10LOG010 \$ 120

INTERNET KEYBOARD

PC KEYBAORDS FOR FAST WEB NAVIGATION

WEB BROWSER CONTROL AT YOUR FINGERTIPS The Logitech Internet keyboard puts all your favourite Web commands, applications, and sites right at your fingertips. This is a complete solution that provides all the functionality you want for entering text into your favourite applications, controlling your

NEWTOUCH COMPACT KEYBOARD

COMPACT, COMFORTABLE KEYBOARD WITH INTERNET ACCASS The Logitech NewTouch Compact keyboard combines a comfortable split contoured key layout with a space-saving design that fits easily into your work environment. This complete Keyboard solution provides ultraresponsive, full-sized keys; convenient Windows Hot Keys; one-key Internet access; and a detachable plam rest.

10LOG012 \$95

computer, and making the most of your on-line time. 10LOG011 \$75 Sales staff are available (est) 9am-6pm Monday to Friday, 10am-4pm Saturday Technical Support (5 Days a week 9am-6pm) Phane (02) 8344-3160

Salas Hotline 02 3344 3190

29











delong Computers

lata Switches

CPU SWITCH

The most economical way to control multiple computers and servers from a single console. Never again will you need multiply monitors, keyboards and pointing devices with the range of CPU Switching devices. A single keyboard, mouse and monitor can control up to 8

computers simultaneously without any cable changes. These CPU Switches are digital and require only the push of a button. Excellent for network administrators or anyone who wishes to control 2 or more computers hassle free!

Features:

- · Supports Mouse/KB emulation for automatic bootup
- · Supports VGA, SVGA & Multisync monitors
- · LED's give current status

CS-122

AT CPU Switches

for computers with serial mice & DIN Keyboard interface

- · Supports Serial Mouse, 5DIN keyboard, standard 15PIN VGA connector
- . Use hot keys (kb) or buttons to switch between computers
- . Auto Scan for monitoring PC periodically
- . VGA Bandwidth of 100Mhz

- CS-102

*Support up to 1024 x 768 Mhz @85Hz

Control up to 2 PCs with the CS-102.

AT and PS/2 CPU Switches catering for all computers

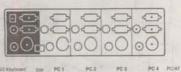
VGA

- Mouse

VGA

Keyboard

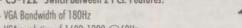
- . Use PS/2 or AT peripherals to control all PCs
- . Supports Microsoft Intellimouse & Logitech Mouseman
- · Autoscan mode to automatically ocor switch between Pcs
- . LEDs give current mode status
- . CS-122 requires the input device to be PS/2 else convertor required



- CS-122 Switch between 2 PCs. Features:

- VGA resolution of 1600x1200 @60Hz





- CS-104 Control up to 4 PCs with the CS-1

- VGA Bandwidth of 100Mhz
- VGA Resolution of 1024x768 @80Hz

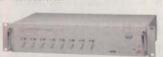


CS-114 **\$415** DSADE038 (As CS-104 with support for Intellimouse)



- VGA Bandwidth of 180Mhz
- VGA Resolution of 1600x1200 @60Hz

\$795 DSADE041



CS-104

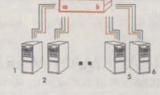
- CS-106

Control up to 6 PCs with the CS-106

\$245 DSADE030



\$395 DSADE020



 \Box

ICPU SWITCH CABLE SET

For use with the CPU Switches, each Cable Set connects 1 computer to the switch.









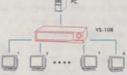
VIDEO SPITTERS

can duplicate PC video signals and amplify them for transmission to multiple monitors. These splitters are

capable of supporting high band widths, which can easily accommodate the latest resolution technology. An excellent choice for presentations or broadcasting demos or special events.

Specifications:

- Max cable distance of 65 meters
- Supports VGA, SVGA & multisync monitors
- Slide switch for Video Signal Gain Control



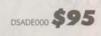
VGA Bandwidth:

- VS-108 supports 180Mhz

VGA Resolution (MAX)

- VS-102 / VS-104 supports 200Mhz VS-102 / VS-104 supports 1600x1200 @70Hz
 - VS-108 supports 1600x1200 @60Hz



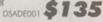




VS-104

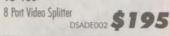
2 Port Splitter

4 Port Video Splitter



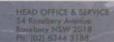


VS-108





1.8m Video Splitter to Monitor Cable \$9 CBGENO35



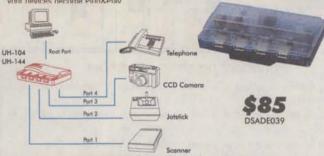
CITY OFFICE 127 York Street Sydney NSW 2000 Ph: (02) 9267 5272 Fax: (02) 9267 5042



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UNIVERSAL SERIAL BUS (USB) HUB

While most PCs will only support 2 USB ports, the UH-144 can support up to 4 devices with The ATEN USB Ethernet Adapter provides an easy way to connect a USB-enabled the option to daisy chain. It supports both full speed (12Mbps) and low speed devices such as keyboards and joysticks. No more complications with DMA & IRQ conflicts, with USB



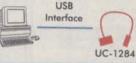
USB ETHERNET ADAPTER

desktop or laptop PC to a 10BASE-T Ethernet LAN. It uses a USB type A receptacle for connection to the USB port and RJ-45 receptacle for connection to the network. No more internal PC cards to deal with. Just plug it in and your ready to go (PnP). Compatible with desktop and notebook computers. For use with IEE802.3 10Base-T LANs.

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Parallel Interface

DSADE041



\$15 CBGEN155



\$15 CBGEN156

USB B CABLE

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APRIL Page

Notebook Models

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	NEW	NEW	NEW	NEW
All models in table feature USB	Satellite 2520CDT	Satellite 4030CDT	Satellite 4060XCDT	Satellite 4080XCDT
Processor	AMD K6-2 300MHz	Celeron 300MHz	Pentium II 333MHz	Pentium II 366MHz
RAM Std/Max	64/192 MB	64/192 MB	64/192 MB	64/192 MB
Hard Disk	4GB	4GB	4GB	6GB
Screen	12.1" TFT	13.3" TFT	14.1" TFT	14.1" TFT
Display	800 x 600	1024 x 768	1024 x 768	1024 x 768
CD-ROM	24x max.	24x max.	24x max.	24x max.
Mic & Spkr	Speakers	Speakers	Speakers	Speakers
Battery Life	3+ hours	3+ hours	3+ hours	3+ hours
Port replicator	No	Yes	Yes	Yes
Select bay	No	No	No	No
DVD capable	No	No	No	No
Weight	3 kg	3 kg	3 kg	3 kg
Warranty	1 Year	1 Year	1 Year	1 Year
DAA modem	No	No	No	No
Op. system	Win 95/98	Win 95/98	Win 95/98	Win 95/98
Rent 3Yrs.**	\$27.17/wk*	\$31.12/wk*	\$39.58/wk*	\$47.57/wk*
Inc Tax	\$3,450	\$3,998	\$5,240	\$6,298
Part number	(30599)	(72302)	(72303)	(72304)

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view detail on all of these
products and accessories.
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	NEW	NEW	NEW	NEW	NEW	NEW
All models in table feature USB	Portégé 3020CT	Portégé 7020CT	Tecra 8000 333	Tecra 8000 333	Tecra 8000 366	Tecra 8000 366
Processor	Pentium 300MHz	Pentium II 366MHz	Pentium II 333MHz	Pentium II 333MHz	Pentium II 366MHz	Pentium II 366MHz
RAM Std/Max	32/96 MB	64/192 MB	64/256 MB	64/256 MB	64/256 MB	64/256 MB
Hard Disk	6GB	6GB	6GB	6GB	10GB	10GB
Screen	10.4" TFT	13.3" TFT	13.3" TFT	13.3" TFT	14.1" TFT	14.1" TFT
Display	800 x 600	1024 x768	1024 x 768	1024 x 768	1024 x 768	1024 x 768
CD-ROM	No	No	24x max.	24x max.	24x max.	24x max.
Mic & Spkr	Yes	Yes	Yes	Yes	Yes	Yes
Battery Life	2.5+ hours	2+ hours	3+ hours	3+ hours	3+ hours	3+ hours
Port replicator	No	No	No	No	No	No
Select bay	No	No	Yes	Yes	Yes	Yes
DVD capable	No	Yes	No	No	No	No
Weight	1.3 kg	1.9 kg	2.9 kg	2.9 kg	2.9 kg	2.9 kg
Warranty	3 Years	3 Years	3 Years	3 Years	3 Years	3 Years
DAA modem	No	Yes	Yes	Yes	Yes	Yes
Op. System	Win 95/98	Win 95/98	Win 95/98	Win NT 4.0	Win 95/98	Win NT 4.0
Rent 3Yrs.**	\$31.88/wk*	\$55.86/wk*	\$49.77/wk*	\$51.28/wk*	\$64.51/wk*	\$65.98/wk*
Inc Tax	\$4,159	\$7,395	\$6,589	\$6,789	\$8,540	\$8,735
Part number	(72301)	(72305)	(72306)	(72307)	(72308)	(72309)

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See page 4 for more specifications

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54,159

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See page 4 for more specifications

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See page 4 for more specifications

Tecra 8000



8,540

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- **№ 10GB HDD**
- **№** 14.1"TFT

See page 4 for more specifications

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(68800)

Part #	Model	CPU		MB RAM	A CONTRACTOR OF THE PARTY OF TH	Screen	\$\$
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(68801)	2635-JBA	PII300MHz	4	32	NT	13.3"TFT	\$5,549
(68802)	2635-JGA	PII300MHz	4	32	98	13.3"TFT	\$4,845



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per week over 3 years (20760)

Part #	Model	CPU		MB RAM		Screen	\$\$
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(41710)	2626-50M	PII233MHz	3.2	32	98	12.1"TFT	\$3,940

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6287-21A



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PC 300GL PII 400MHZ 6275-65A



- Intel Pentium II 400Mhz with 512Kb L2 Cache
- 32MB SDRAM
- 3.2GB Ultra ATA HDD with S.M.A.R.T.
- 3.5" 1.44MB Floppy disk drive
- · Graphics Chipset: S3 Trio3D AGP, 2MB
- Standard 104 keyboard
- Operating System: Windows NT 4.0

(65976)

CD-ROM Optional

Without monitor:

52,220

With monitor:

(65976 + 47189)

2,627

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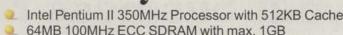




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IBM Netfinity File Servers

Netfinity 5000 File Server



2 of 2 PCI/ISA slots free, 3 of 3 PCI slots free

Dual Channel Wide Ultra SCSI Disk Controller (SCSI-3 on planar)

Integrated-ethernet 10/100 network Interface

32x max. CD-ROM disk drive

16-bit PCI

Installed operating system optional

Enhanced 2-button mouse

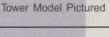
. 3.5" 1.44MB diskette drive

Basic 101-key keyboard

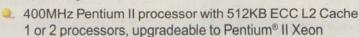
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\$5,594

Processor IBM# Part# Type PII 350Mhz 865912Y Tower 5,594 (69403)PII 350MHz 96591SY Rack 5,760 (69404)(69405)PII 400MHz 865922Y Tower 5,850 6,199 PII 400MHz 86592SY Rack (69406)6,389 PII 450MHz 865931Y Tower (69407)PII 450MHz Rack 6,749 (69408)86593RY



Netfinity 5500 File Server



128MB RAM standard, maximum 1GB

Dual Channel Wide Ultra SCSI RAID (IBM ServeRAID II on planar) and EIDE (on planar), 0MB installed.

Maximum storage capacity: 54.6GB

6 x 32-bit, full size, PCI slots (4 hot swap) 1 x F.S. ISA

CD-ROM 32x maximum

Dial-in for control/monitoring/remote management (modem required)

Temperature and voltage monitoring

(62174)

\$9,425

Part#	Processor	IBM#	Туре	\$
(62172)	PII 350MHz	866011U	Tower	9,169
(62173)	PII 350MHz	86601RU	Rack	10,125
(62174)	PII 400MHz	866041U	Tower	9,425
(62175)	PII 400Mhz	86604RU	Rack	9,772
(69409)	PII 450MHz	866051U	Tower	11,745
(69410)	PII 450MHz	86605RU	Rack	11,745

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The Netfinity
Server Tower
comes
complete with
keyboard,
mouse and
NIC. The 5500
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warranty.

Netfinity options

IBM Ultrawide SCSI HDD Hot-Swap 4.51GB

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9.1GB

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(65982)

IBM 12/24GB DAT Tape Backup

\$2,499

(52388)

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Brio 8531	P2-350Mhz	32Mb	4.3Gb	15" Mon	32xCD	Win98	71612	52439
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NT/Win	Vectra Model	CPU	HDD	RAM	CD	Graphics	Price
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WinNT	D8152N	PII400MHz	4.3GB	64MB	No	MGA G200	Call for pricing
Win98	D8174N	PII450MHz	8.4GB	64MB	Yes	MGA G200	Call for pricing

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(65662)	6572 Pentium II	350MHz	3.2GB	64MB	No	MGA G100	\$2,439
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526

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(66428)





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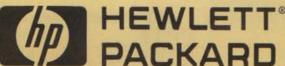






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- Microsoft Powerpoint Outlook and

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Palmtop



(640x480 at 256 - 190MHz

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(71162)

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OmniBook 900

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65203

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- 32MB RAM (Max. 160MB)
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- 56KFlex Data/Fax Modem
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See Web Direct for Windows NT options

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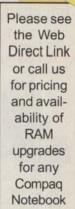


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Air Deluxe **Universal Case**

Direct



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(72099/72100)

(66929)

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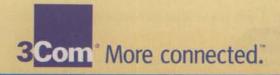
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(74373)



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(71103)

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The Jaz 2GB drive bundled with the Jaz Traveller adapter. The Jaz Traveller allows you to connect your portable SCSI Jaz drive to the parallel port on any PC, making it easy for you to use your Jaz drive on a computer that does not have a SCSI or PCI SCSI adapter installed.

(71582)

(70623) 526



Get started with the Zip starter kit! It's a portable parallel interface Zip drive plus four fun and practical, coloured 100MB Zip disks that are ideal for colour coding all of your computer stuff in the office, at home, at school, or anywhere. The colours make even easier to find what you are looking for.

ATAPI Retail

(16629)

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(53998)

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20



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networking team

Benefits of Catalyst Desktop Switches



- With their own, dedicated bandwidth, users can access network resources whenever they need to, without competing with other users
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2912 XL



2912/2924XL



2924C XL and 2924 XL

Catalyst model	Switched 10BaseT/ 100BaseTX ports	Other technologies	Part number	Price		
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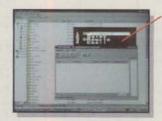
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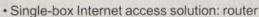
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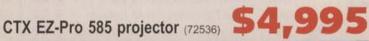
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(74409)



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The drive can be installed horizontally or vertically



Contents:

- . MP7040A CD-R/RW Drive
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System Requirements: Minimum Pentium 100MHz, 32MB RAM, 75MB available hard disk space, Win 95,98,NT

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Seagate 12/24Gb SCSI DDS-2 DAT Drive Internal (56150)

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HARRIS

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- * Scala MM200 multimedia authoring software
- * 2 blank media
- * Audio and data cables
- * Quick Installation Guide



PRO-KIT Internal SCSI 4x8 CDR | PRO-KIT External SCSI 4x8 CDR

FOR THE SERIOUS USER...

- * Internal Panasonic Drive
- * AdvanSys PCI SCSI controller card
- * WinonCDToGo V4.5 CDR Software
- * Scala MM200 multimedia software
- * 2 blank media
- Audio and data cables
- * Quick Installation Guide



FOR PORTABILITY

- * AdvanSys PCI SCSI controller card
- * Sturdy self-contained external enclosure for recording stability
- Scala MM200 multimedia authoring software
- WinonCDToGo V4.5 CDR software
- 2 blank media
- Audio and data cables
- Quick Installation Guide





The DVD PRO-KIT unleashes the most recent technology and brings movies, video and digital surround sound to life all on your PC! This kit provides you with everything needed for you to experience advanced desktop entertainment and enhanced video games.

PRO-KIT Hardware Decoder



FOR UPGRADING PC'S

- Pioneer DVD-Rom Drive (32xCD-Rom)
- * Cinemaster PCI decoder card
- Websters DVD Interactive Encyclopedia
- * Audio and data cables
- Quick Installation Guide

PRO-KIT Software Decoder



FOR NEW PC'S

- Hitachi 6xDVD-Rom drive (24xCD-Rom)
- * Power DVD software decoder
- * Riva 128ZX 2D/3D AGP graphics card
- * Webster's DVD Interactive Encyclopedia
- * Audio and data cables
- * Quick Installation Guide

\$499

(74356)

Media



Princo 74min (74357)

53



Princo 80 min

For full audio duplication

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Princo 74 min Re-Writable (74397)

512

APRIL

5479

(74355)

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Banksia Wave SP56 Dual

Catch the V.90 Wave!

(46276)



Intra

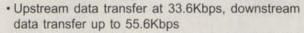
4x Dual Mode K56 Flex/V.90 Data Modems on ONE PCI Board

(65782)

51,127

The Wave SP56 Dual modem lets you fly through the Internet faster than ever before, as much as twice as fast as previous modems.

- ITU V.90 and K56Flex Dual Mode operation
- · Smart answer phone
- · SVD capable
- · Hands free full duplex speakerphone with echo cancellation

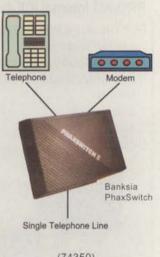


· 3 year parts & labour warranty, with lifetime support

Banksia PhaxSwitch II

Operate your Small Business on One Phone Line

Allows small businesses and home users to take advantage of Telstra's FaxStream Duet Service. It allows the operation of two communications devices (modem, phone, fax machine, answering machine) on a single phone line, without having to maually switch the devices or incur the costs of installing and maintainting a second phone line. Each can function with a separate phone number over the same phone line.



(74350)



Zetafax

The most advanced fax software for your PC network

Easier than using a fax machine and the faxes you send will be sharper. Saves time and money:

no more waiting by the fax machine. Zetafax queues faxes for sending and will redial automatically if the line is busy. Monitor faxes sent and received. Detailed logs for each fax indicate where and when it was sent. View or print received faxes. Supports all major operating systems. Includes client and server software. Scalable. E-mail gateway option.

Single User NT System (24924)

5 User System (36049)

Banksia CommServer

Affordable remote access for everyone in your business



CommServer CS410 is a communications and remote access server with an Ethernet connection designed to provide shared inwards and outwards communications over an office Ethernet LAN.

- · Allows multiple users to concurrently access the Internet, send a fax or access remote data
- · Simultaneously share up to 4 external modems with regular phone lines
- · Start with one modem, add more later when needed.
- · Dial-in remote access

4 ports (58577) \$1,054

APRIL 32

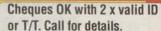
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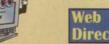












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Communicate with Netcomm

NetComm SmartSecurity Hardware Firewall



(70906)

53,550

- · Protects a LAN from Internet hackers and intruders
- · Active Web content filtering ensures that network users are protected from undesirable Internet information
- Easy to install and manage
- · Separate ports for WAN, DMZ (Demilitarised Zone) and LAN

Internet security solution

Firewall

Web content filtering

esigned for small to medium-sized business networks, NetComm's SmartSecurity is the industry's most affordable Internet security solution and offers a powerful combination of firewall and Web content filtering.

It uses the latest third generation firewall technology, 'Stateful Inspection' which examines all OSI layers to either accept or reject the requested communication.

Stateful inspection is invisible to the users on the LAN and requires no client configuration.

In addition it supports numerous Internet protocols, Including TCP and UDP which are required by applications such as DNS, DHCP and Real Audio.

NetComm Roadster II

56 USB

Now with SYMANTEC WinFax PRO

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Buy a laptop + a NetComm Global Card and get a 10/100 Ethernet Card FREE!

NetComm 56 Global/ **GSM Card**



5332

NetComm CardModem 56 Combo Ethernet



(52693)

NetComm Roadster II 56K V.90 Ultra SVD



(61194)

(30658)



S315

Modem



5250

33

NetComm Card Modem 56

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The ultimate in speed and portability. Send and receive faxes at speeds of up to 14,400bps, while data download speeds of up to a scorching 56,000bps are supported. K56Flex, FLASH upgradable to new ITU standard V.90 via download from website.

(52694)

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- · Connect via Universal Serial Bus Port
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Lucent Technologies Bell Labs Innovations

Xircom RealPort Ethernet 10/100 + Modem 56

The integrated PC Card: nothing to break, nothing to lose



The RealPort Ethernet 10/100+Modem 56 combines 10/100Mbps Ethernet, 56K modem, GSM, AMPS cellular and ISDN connectivity, in a single cable-free Integrated PC Card solution. No custom cables to lose, no pop-out jacks to snap and leave you stranded. All you need are standard Ethernet and telephone connectors. GlobalACCESS™ features make it easy to connect to information from any location, anywhere in the world.



1. Slide into PC Card



2. Plug in standard LAN & phone connectors



3. Ready to access information in the office or on the road



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CreditCard

56K modem

CreditCard

10/100

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10Mbps

Pocket

Ethernet

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(27310) **\$250** UTP

56K Modem + MiniDock

(10257) **\$538** Coax

From (56359)

\$558



CardBus 10/100 Ethernet

(38605) \$325



Credit Card GSM Modem

Ericsson compatible

(55026) 5369



MiniDock Connector System

(55838) \$59

Xircom RealPort Value 56 Modem



(72923)

(68724)

High speed 56K modem functionality for notebooks. All connectors are integrated into the card providing a robust, reliable and easy-to-use solution. With no cables to lose and no moving parts to break, the RealPort Value 56 Modem will save you money with fewer support calls, less user downtime, no more need for cable replacement.

Xircom RealPort Modem 56 GlobalACCESS

Offers mobile users high-speed 56K modem, GSM, AMPS cellular & ISDN functionality in a robust Integrated PC Card with built-in connectors. GlobalACCESS™ features make it easy to connect to information from any location, anywhere in the world. Flash ROM-upgradeable to 56K (V.90) at no charge. Also available in CardBus version.

(67216)

Xircom RealPort Ethernet 10/100

RealPort Integrated PC Card LAN solutions offer mobile users high-performance 10Mbps and 100Mbps Ethernet connectivity for the most reliable access to information while in the office.

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- · Full-duplex Ethernet at 10Mbps

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Award-Winning Colour Printing

Tektronix Phaser 740L

Should I get a black & white or colour printer?

Yes

With the incredibly affordable Tektronix Phaser 740L colour-capable laser printer, the choice is easy. Start with a high-performance black & white printer. When you're ready, step up to colour by simply sliding in a few colour cartridges and you'll be printing in amazingly rich colour before you

Colour-Capable Laser Printer

(71835) \$3,775

Tektronix Phaser 740

Never Say Never...



That is until it comes to making a choice between an affordable colour laser printer or one with extraordinary print quality. It's a compromise you'll NEVER have to make with the Tektronix Phaser 740 colour laser printer. For breathtaking images that leap off the page, at a breakthrough colour laser price, look to the Phaser. That way, you'll never have to compromise. Never.

Colour Laser Printer

(71836) \$4,895

- Print size A4
- 10BaseT for network-ready printing right out of the box I
- No developers or other special components that need regular service
- Adobe Postscript 3
- Optional automatic duplexing



		/4UL	/40
Full colour print	ing	add colour kit	standard
Max resolution	black	1200dpi	1200dpi
	colour		600dpi
Memory	standard	16MB	32MB
	max	256MB	256MB
Image processo	or	133MHz	133MHz
Print speed	black	16ppm	16ppm
	colour	-	5ppm
Pipeline printing	3	optional	optional
Duplex	manual	standard	standard
	auto	optional	optional

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C,M or Y toner (71855, 71856, 71857)

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16MB memory (71844)

5439

32MB memory (71845)

S875

Glossy coated paper (100 sheets) (71879)

5218

Extra 1 year on-site warranty (71852)

5896

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(62585)

Iron-on transfers

10 sheets A4

529

(52818)

Glossy greeting card paper

10-pack

\$18

(70192)

Premium paper

200 sheets A4

\$39

(19172)

Premium

glossy paper 10 sheets A4

\$22

(21171)

Premium glossy paper

50 sheets A4

(24427)

HP DeskJet Printers

HP DeskJet 695C

Easy to use - great quality

- HP PhotoREt Technology
- · Dual cartridge
- · ColorSmart II
- New improved driver Windows 3x/95/NT 4.0
- Photo capable with optional Photo Head
- New super economy mode
- Black: 600x600dpi, 5ppm
- Colour: 600x300dpi, 1.7ppm



(66260)

\$259

HP DeskJet 710C



Do you dream in colour?

- HP PhotoREt II Technology
- Black: 600x600dpi, 6ppm
- Colour: 600x300dpi, 3ppm
- 100 sheet paper tray
- Quiet operation
- Photo-quality colour for home or office
- · Handles many types of paper

(68905)

\$329

HP DeskJet 880C

Super-fast, stunning print quality on plain paper

- HP PhotoREt II Technology
- · Black: 600x600dpi, 8ppm
- Colour: 300x300dpi, 5ppm
- Poster and n-up printing
- USB and parallel interface
- Black text more crisp and laser-like than ever
- Photo-quality colour



72920)

\$569

USB & PARALLEL

HP DeskJet 895Cxi

The high-performing, photo-quality colour printer for business productivity.

- HP PhotoREt II Technology
- · ColorSmart II
- Networkable with optional JetDirect print server
- Laser-quality text and brilliant photo-quality images
- Black: 600x600dpi, 10ppm
- Colour: 6ppm

\$790



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Page 36

HARRIS

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FOR THE



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HP Laser Printers

Visit the Web Direct link for HP papers, toners etc.

HP LaserJet 1100 Printer

HP's JetPath technology allows you the flexibility to expand the HP LaserJet 1100 printer into an All-in-One performer when your business needs grow. 600dpi print resolution. 8ppm print speed. 2MB RAM.

(70095) 5789

HP LaserJet 1100A Printer - Copier - Scanner

If your current business needs require the HP LaserJet 1100 with copying and scanning capabilities, move up to the LaserJet 1100A. Printing, copying and scanning: all-in-one. Crisp, sharp laser

printing. Make laser copies at the touch of a button. even without the PC turned on. Scan resolution 600dpi enhanced, 300dpi optical.

(70096)

HP LaserJet 2100 Series

All feature:

- 1200dpi
- 10ppm
- · 60MHz processor
- · 350-sheet paper capacity
- · 15.000 page monthly duty cycle
- Excellent performance
- · Superior value



LaserJet 2100

A fast flexible laser with room to grow. (4MB RAM, EIO, PCL 6)

(72291) \$1,439



LaserJet 2100M

A fast flexible laser with PS and PCL. (EIO, PCL 6, 8MB RAM)

(72292) 51,599



LaserJet 2100TN

A complete network printer. (EIO, PCL 6, 8MB RAM, additional 250-sheet feeder, HP JetDirect print server installed)

(72293) \$1,898

Is your old printer costing you money? Upgrade and save!

It doesn't always pay to hang on to the past. For the true cost of to consider the many ongoing expenses like: maintenance, energy consumption, reduced effiency, parts, speed, risk of failure and so on. Upgrading your HP LaserJet printer can downgrade your print costs!

- · Increase productivity: New LaserJet printers offer faster printing, shorter warm-up periods, larger memories, faster processors
- ownership of a laser printer, you need . Lower overall printing costs: Use up to 50% less toner, up to 80% less energy
 - · Less downtime: New LaserJet printers are more reliable, and cost less to repair
 - · Greater systems compatibility
 - · Sharper print quality
 - · Fully networkable, and offer EIO ports



Figures based on usage analysis of

5,000 pages per

month over 3 vrs

Here's the difference.

New LaserJet 4000	\$	Old LaserJet III	\$
Printer cost/month (purchase price over 3 years)	63.83	Printer cost/month (fully paid-for LaserJet printer)	0.00
Consumables/month	178.44	Consumables/month	248.00
Power cost/month	2.04	Power cost/month	19.42
Maintenance/month	6.25	Maintenance/month	12.97
Total cost/month	250.57	Total cost/month	280.39
Total ownership cost over 3 yrs	9,020.58	Total ownership cost over3 yrs	10,094.21
The second secon	10001		

Total savings over 3 yrs \$ 1,073.64

Total savings over 3 yrs

for 20 machines \$21,472.80 Like to know how much you could be saving by upgrading to a new HP laser printer? Call Harris Technology today on (02) 9925 9925!

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17ppm 100MHz 1200 dpi 4MB RAM From

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6200C

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5739

(66184)



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Scanjet 6250C with 0EM ADOBE PHOTOSHOP 5.0!!

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Scanjet 6250C with Omnipage Pro 9.0

\$1,190 (70707)

APRIL Page 38

HP Scanjet 3200C

Best Value for home

- · 600dpi optical, 9600dpi enhanced
- HP PrecisionScan LT OCR software, Adobe
 PhotoDeluxe 2 included
- · Parallel port
- 30-bit image processor



4

\$209

(74116)

HP Scanjet 4100C

The easiest scanner for home

- · Guided workflow for quick results.
- · One-touch scan and copy buttons.
- · Easy to set up and fast operation with USB.

 Resolution: 600dpi Hardware Super Sampling, 1200dpi enhanced.

(67196)

\$279



HP ScanJet 5200C

Highest productivity for business

- · 600dpi optical, 9600dpi enhanced
- USB &
- HP PrecisionScan 2.0 OCR software, Adobe PhotoDeluxe Business edition, Caere PageKeeper Standard, On-line email & Web Task software
- · ScanJet copy utility
- USB and Parallel

(74118)

5499



HP Scanjet 6250C

Best image quality for professionals

- A powerful networkable scanner
- Resolution: 1200dpi Hardware Super &SCSI Sampling, virtually unlimited enhanced resolution
- · USB/SCSI capable
- Integrated automatic document feeder

(66185)

5939



Features of Intelligent Scanning Technology	3200C	4100C	5200C	6250C
Push button scanning		1	1	1
Dual image scanning	1	1	1	1
Auto descreen/deskew	1	1	1	1
Integrated OCR	1	1	1	1
36-bit colour image processor		1	1	1
Scan direct to application (drag & drop)		1	1	1
Line art enhancement			1	1
Preview outline by region type			1	1
Auto page format retention			1	1
HP PrecisionScan LAN for network sharing				1
Intelligent Assistance				1
Unlimited enhanced resolution				1
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35mm slide scanning				1

HP Scanning Technology at a glance

It does the thinking for you!

















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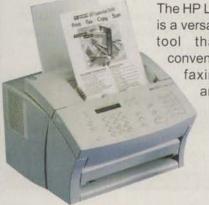
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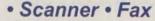
The HP "All-in-One" Series

HP LaserJet 3100



The HP LaserJet 3100 is a versatile business tool that delivers convenient printing, faxing, copying and scanning capabilities in a single device.

Printer • Copier



		- Control of the Cont
Printer:	Print resolution:	600x600dpi
	In/output trays:	100 sheets
	Print speed:	6ppm
Fax/PC Fax:	Fax memory:	150 pages
	Speed dials:	175
Copier:	Max copies:	99
	Zoom:	50-200%
Scanner:	Scan resolution:	600 enh./300 opt.
THE RESERVE		

(58566)

\$1,349

HP OfficeJet 635

Completing your work in colour is now convenient and easy. The HP OfficeJet 635 prints, scans and copies in colour, plus it's a plain paper fax. You get four essential office devices in one powerful package!



· Colour Printer · Colour Copier

· Colour Scanner · Fax

Printer:	Print resolution:	600x600dpi black
		600x300dpi colour
	In/output trays:	100 sheets
	Print speed:	5ppm black
		2ppm colour
Fax/PC Fax:	Fax memory:	150 pages
	Speed dials:	65
Copier:	Max copies:	99
	Zoom:	50-200%
Scanner:	Scan resolution:	12 enh./300 opt.
(55544)	PRICEDROP	5790

HP OfficeJet Pro 1170C Series

The All-in-one, easy-to-use colour printer, colour copier, & colour scanner that provides professional quality and performance.



Print, copy, scan, all in colour!

(63098)	From \$	1.365
Scanner:	Scan resolution:	12 enh./300 opt.
	Zoom:	25-400%
Copier:	Max copies:	50
		5ppm colour
	Print speed:	9ppm black
		600x600dpi colour
Printer:	Print resolution:	600x600dpi black

The 1175C model also features integrated PC faxing and has a 30-page automatic document feeder for unattended copying or scanning.

HP OfficeJet 710



Prints, faxes, scans & copies all in colour (74303)

\$969

BUY the OfficeJet 710 and receive the Party Pack FREE!!



The Party Pack includes: C1816A photo cartridge 6 sheets of HP Premium Photo paper 10 sets of HP **Greeting Cards** and envelopes 1 continuous stack of 10 sheets of banner paper. Offer valid while stocks last.

> APRIL Page 39

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Black ink cartridge for Stylus 740

548

(70091)

Tri colour ink cartridge for Stylus 440/640/ 740

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(70092)

See the Web Direct Link for others. EPSON STYLUS COLOR 900 - The fastest A4 colour inkjet printer in its class



Combines ultra-fast true black & colour print performance with high quality output from its enhanced 1440dpi print technology & the EPSON PerfectPicture Imaging System.

- * 12ppm A4 memo black text page, economy mode
- * 11.7ppm A4 memo colour text page, economy mode
- * New EPSON Ultra MicroDot™ at 3 picolitres, world's smallest ink droplet in black and colour, high capacity black ink cartridge for volume printing
- 1440dpi print resolution, enhanced EPSON Variable-Sized Droplet Technology

(74351)

\$799

EPSON STYLUS PHOTO 1200 - The affordable A3+ colour printer



Combines EPSON's 1440 dpi PerfectPicture Imaging System with a 6-colour QuickDry™ ink palette and A3+ (329 x 483mm) paper handling. This means you can now produce full bleed A3, Photo Reproduction Quality images complete with crop/registration marks.

- * A3+ Photo Reproduction Quality printing
- * 6 colour QuickDry™ inks, Variable-Sized Droplet Technology
- * Enhanced print speeds for photos, graphics and text
- * Parallel, USB serial interfaces, Win 95/98, NT 4.0 compatible (74352)

5975

EPSON EPL-N1600 - Grows with your business



ARRIS

The EPL-N1600 offers 1200dpi high class performance printing for workgroups or demanding stand-alone users. The EPL-N1600 has a list of options designed to provide freedom to upgrade as your business grows.

- * 1200dpi class printing with MicroGray 1200 and BiRITech, speed up to 16ppm
- * 8Mb RAM, expandable to 40Mb.150Mhz processor.
- Up to 3 different paper sources 1 x 250 sheet cassette, 1 x 80 sheet multipurpose feeder and an optional 500 sheet cassette, offering 830 sheets total paper capacity.
- * Optional network connectivity

(74388)

\$1995

EPSON EPL-5700 Laser printer

Networkable, speedy laser printing with MicroGray 1200 technology for finer detail. Compact enough to fit on any desktop. Up to 8 pages per minute print speed at 600 dpi resolution. 4MB memory standard. 50-200% zoom. Print layout and watermark functions. 100MHz CPU.

\$865



Page 40

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Canon BJC-7100

Colour Bubble Jet Printer



1200 dpi !!

- High resolution: Prints up to 1200dpi
- Up to 7.6ppm mono, up to 4.8ppm colour*
- Seven colour printing system produces 25 saturation levels per pixel on any medium, including plain paper
- PhotoRealism cartridge (BC62e) included
- Printing on plain paper is 99.4% water fast, colours are more vibrant and tones are sharper

Canon BJC-255SP

Colour Bubble Jet Printer

- Resolution: 360 x 360dpi
- Up to 3.4ppm mono, up to 0.52ppm colour*
- Optimises low resolution Internet images
- Gold standard photographic printing with optional Photo-Realism inks
- Super Economy mode for lowcost printing



(61684)

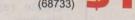


CanoScan FB320P

Flatbed Scanner



(68733) \$169



- Only slightly larger than a sheet of A4 paper
- Spectacular image quality
- Comes with fun-filled photo-editing software
- Includes driver to convert your CanoScan into a photocopier!
- Parallel interface
- Maximum document size A4/Letter
- Selectable resolution: 25 to 2400dpi
- Optical Resolution: 300 x 300dpi

APRIL Page

Canon BJC-4310SP

Colour Bubble Jet Printer

- Super Economy Mode for low-cost printing
- Canon's Drop Modulation Technology™ delivers smoother colour gradations
- Use Canon's PhotoRealism inks for more colour combinations and virtually no pixelation
- Optional scanner head
- Super fast black & white: 4.5ppm*
- Banner printing: up to six A4 pages in length!

- Resolution: 720x360dpi



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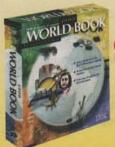
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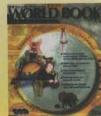


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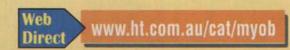




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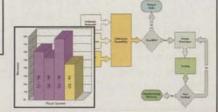


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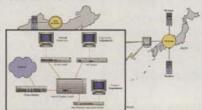
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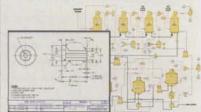
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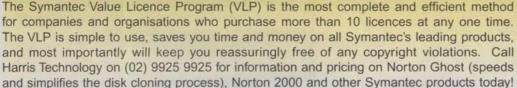
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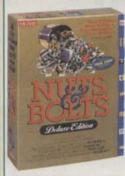
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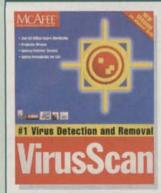
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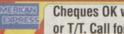
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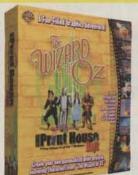
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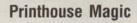
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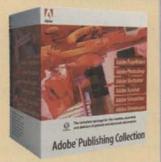
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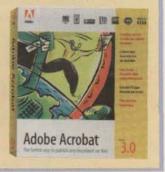
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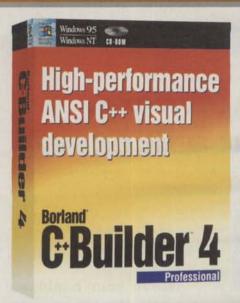
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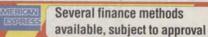
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Leading Disaster Recovery

Seagate Backup Exec

From the developers of the utilities that Microsoft ship with NT 3.51, NT 4.0 & soon NT5

Key Features:

Intuitive User Interface

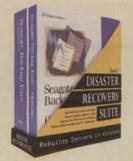
Wizard driven solution to make even the most complex backup routines and operations simple and easy to use, even for an inexperienced operator

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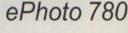


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remain attached to the carriage and move back and forth, delivering ink to the page as the paper advances through the printer. Smart chips monitor the amount of ink used, so ink supply is instantly replenished, even at top speeds.

The new, individually replaceable printheads are designed for long life. The cartridges contain twice the ink supply of current HP cartridges. Smart chips will let you know

when to replace a component.

The benefits

- By separating printheads and ink cartridges, you only replace the component that is no longer usable
- · Cuts up to 30% off the printing costs over other desktop printers
- Longer-life printheads and higher-capacity ink cartridge means less frequent replacement
- · Achieves colour laser speed in a personal dektop printer



4 individual ink cartridges

APRIL Page 56

HARRIS TECHNOLOGY APR

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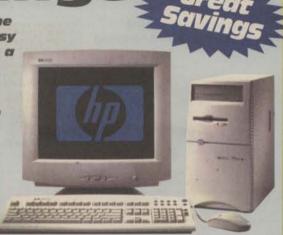
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EPS330 EPSON Stylus Color 740



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EPS315 EPSON Stylus Color 850



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CAN235 Canon BJC-255SP Printer.



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BJC-4650

- Full colour printing up to A3 for CAD, DTP and design work.
- Convert your printer into a colour so with the optional scan head.
- * Automatic switching for Windows and Macintosh PhotoRealism, the gold standard, near silver-halide photographic quality.
- Drop Modulation Technology™ for improved colour gradations, on any paper.
- * Economical colour print head for plain paper printing * Image Optimiser improves quality of images down-lo from the Internet.
- · Optional high-speed black ink cartridge for B&W printing . Fluorescent ink option for signs and retail displays





CANOD1 Canon BJC-80 Portable Printer . CAN218 Canon BJC-4650 Printer All prices INCLUDE sales two. Prices subject to change, see page 48 for terms & conditions.













Printers

DON'T FORGET TO ASK FOR YOUR FREE GIFT

HP DeskJet 880C Printer

HP's fast, versatile, brilliant photo-quality printer for business or home.

The HP DeskJet 880 is packed with features to make your special projects shine. Exclusive PhotoREtII colour layering technology produces brilliant photoquality colour on any paper. ColorSmart II means you get on paper what you see onscreen and laserquality black text gives your documents a professional look.

- · up to 8 ppm black & 5 ppm colour
- resolution 600 dpi black & HP PhotoREtII colour
 ColorSmartII gives you perfect colour
- . HP inks dry fast for smudge-resistant text and photos
- · Print on a variety of papers
- Use photo's to personalise cards, calendars, t-shirts even billboards and banners





HWP355 HP DeskJet 880C

\$569

HP DeskJet 695C Printer

The Printer for Easy, Quality Colour Results!

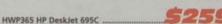
The affordable printer for easy, quality colour results and optional photo quality printing

- 5 pages per minute black
- 1.7 pages per minute colour printing
- . HP's RealLife Imaging System incorporating HP ColorSmart II technology
- · Prints on Plain and special papers, transparencies, labels, envelopes and banner paper
- . Optional HP Photo Cartridge with built-in HP PhotoREt for lifelike, photo-quality colour
- Window NT 4.0, 98, 3,1x and many MS-DOS applications
- * Black and up to 16.7 million colours

- Key Features:

 600x600dpi black resolution and 600x300dpi

 HEWLETT PACKARD calour resolution
- 100 sheet input capacity
- · Parallel interface
- . 1-year limited HP warranty
- Included in the Box:
- · black print cartridge
- · colour print cartridge
- · printer software
- · user's guide

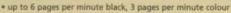


HP DeskJet 710C Prid

HP's brilliant photo-quality colour printer at the right price.

The HP DeskJet 710C makes everything you print look great, even on plain paper. With HP's RealLife Imaging System, brilliant photo-quality colour printing is easy. Built-in ColorSmart II gives you perfect colour automatically, so what you see

on screen is what you get.



- * resolution 600 dpi black, HP PhotoREt II colour
- . built-in photo-quality color
- exclusive HP inks dry fast for smudge-resistant text and photos
- · handles a variety of papers, including plain and special papers, envelopes, transparencies and banners
- · compact design and quiet operation ideal for small workspaces
- · easy setup and operation provide hassle-free printing
- compatible with Windows NT 4.0, 98, 95, 3.1x and MS DOS applications through Windows 98, 95 and 3.1x

HWP346 HP DeskJet 710C...

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Expanding Possibilities

HP LaserJet 1100 & 1100A Printer

HP LaserJet 1100

It's the new, Improved personal laser printer standard

- * 8 pages per minute rated engine speed
- 2 MB RAM handles complex documents with ease
- · Improved print quality produces better graphics and images
- 125 sheets bin capacity
- · Enhanced driver allows manual duplexing and N-up printing
- HP UltraPrecise Toner Cartridge for improved gray scale images
- · Parallel cable in the box
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- · JetPath technology allows you to add copying and scanning capabilities

HWP257 HP LaserJet 1100..

5789

Expanding Possibilities

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HP LaserJet 1100A

All the features of the 1100 plus Print - Copy - Scan

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- . Copy with the touch of a button, with or without the PC on

Automatically feed up to 20 sheets for copying and scanning

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HWP258 HP LaserJet 1100A .

5965

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new colour fax, Standalone black & white

Expanding Possibilities faxing (PC not required), so you can send and receive faxes immediately, PC-assisted colour faxing, Speed dialling and automatic redial, Large, 50 page memory saves important faxes any time tray runs out of paper.

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. Copy - Convenient full-colour copying saves you time, PC not required for black & white copies, PC-assisted colour copying saves trips to copy centre, Easy reduction/enlargement and collation. 5965

HWP369 HP OfficeJet 710 .

HWP213 HP OfficeJet 635.

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results. This one pass mono flatbed scanner is so easy to use that you will be scanning

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automatically Features:

- resolution 600dpi optical; 600 x 1200 hardware; 9600dpi
- * less than 90 seconds for 4x6" colour photo, less than 2.5 mins for full page text, less than 2.5 mins for black & white drawing
- 30-bit internal hardware
- * maximum document size 216mm x 297mm
- includes CD-Rom with HP PrecisionScan LT scanning software with OCR and Adobe PhotoDeluxe
- · supports multiple file formats
- * enhanced parallel interface for Windows 95 or 98
- · includes parallel cable and power cord

HPS027 HP ScanJet 3200C

HP ScanJet HP ScanJet 4100C

The easiest scanner for home

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- · Push button scanning
- . Dual image scanning
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- Integrated OCR . 36-bit colour image
- processor . Scan direct to application
- (drag & drop)



HPS030 HP ScanJet 4100C

HP ScanJet

Highest productivity for business

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HPS026 HP ScanJet 5200C

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mniPage Pro v9.0 Upgrade OMN021
OmniPage Pro
9.0 U/G OEM CA The World's Best OCR Just Got Better



OmniPage Pro 9.0, the latest version of the world's best-selling optical character recognition (OCR) software, lets you quickly and easily convert scanned pages into computer-editable documents, more accurately than ever before. Other new features include enhanced integration with Microsoft Word, and multithreading for faster processing.

. Maximum Zone Flexibility

New OmniPage Pro 9.0 identifies regions of text and graphics on a page to improve recognition and formatting. Let OmniPage Pro find them for you, and then you can add, delete, move, combine and split them any way you

Superior Integration

Superior Integration with MS Word. Now you can perform all your OCR functions directly from Microsoft Word - and proof your results by comparing them to the original image. You can also share a dictionary with Word, so you never have to add a word twice

* Colour

UDE

For the first time ever, OmniPage Pro lets you scan colour documents and save colour graphics into your word processor.

OmniPage Pro 9.0 also comes with

PageKeeper Standard - the easiest

way to organise and find scanned

and electronic documents. If you work with scanned pages, Microsoft

Word files, Web pages or photos,

PageKeeper *

PageKeeper is a must!

. Automatic Proofreader

Automatically checks your OCR results within OmniPage Pro or Microsoft Word and displays the original image for comparison. Like a spell checker, it highlights suspicious words and suggests corrections

· Retains Original Page Layout

OmniPage Pro's enhanced True Page preserves your documents' original "look and feel." By maintaining your layout (columns, graphics, tables, etc.) and your text style (font, size, bold, italics, etc.). you can keep the original layout with a lot less work.

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OmniPage Pro 9.0 automatically detects tables within documents and preserves them as table objects in Word and WordPerfect. And now you can save

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files any way you want. To retrieve,

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containing that word and give you

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Manage any type of

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document:

files, photos,

spreadsheets.

brochures, Web

pages, articles.

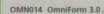
OmniPage Pro 9.0 makes a quantum leap in OCR accuracy. Major improvements in our OCR technology mean you can accurately recognise a greater variety of documents, with far fewer errors:

- * Letters, articles, reports, memos
- * Very small text and number * Even poor-quality copies and degraded faxes.



OmniPage 9.0 U/G Upgrade from ANY OCR software

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PRO528 Microtek ScanMaker4

MICROTEK 35T Plus Slide Scanner

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- . Scans both negatives and
- Scans strips or mounted slides.
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A RESPONDED 35mm slides are far more difficult to scan than standard photos. The 35TPlus is designed to scan purely 35mm slides, delivering not only the higher resolution required for slides, but also by eliminating the use of mirrors and glass, it delivers much sharper images.

PRO504 Microtek 35T Plus

accuracy and much better shadow detail compared to entry level scanners. The benefits are clearly apparent when scanning line art (e.g. logos or line drawings), when you require enlargement of your original, when scanning transparencies or difficult colour photos. A better scanner also means you don't waste your time correcting every scan.

To make sure the X6 offers unbeatable value, an exceptional collection of quality software is offered. This includes Windows software for image editing, OCR (text recognition), document management, a program to create your own digital photo albums, a utility to SCAN to Print/Fax, a large library of backgrounds and stock photography, and great software to automatically blend your pictures with calendars, greeting cards, etc...

Calestons, greening artis, etc.

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PRO526 Microtek ScanMaker X6 Parallel

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* 4 times the definition of entry level

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- . 30 bit colour depth captures over 1 billion colours
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UMA011 UMAX Astra 610P (Parallel interface).

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- Caere Omnipage OCR
- * Presto! PhotoAlbum (Win only)
- · Prestol PageManager



UMAX Astra 1220 Series Scanner The ideal scanning solution for the SOHO or Corporate user!

Software

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• Presto! PageManager

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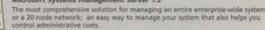
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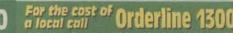








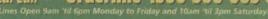




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Microsoft

- . Add a variable or method to a class, and its reflected immediately
- . Realise up to a 30 percent faster compile time for quicker turnaround.

MSS062 Visual C++ Std 6.0 MSS063 Visual C++ Pro 6.0 ... MSS064 Visual C++ Pro 6.0 U/G...

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Product/Components	Description	Pro.	Ent
Microsoft Visual Basic 6.0, Visual C++, Visual FoxPro 6.0, Visual InterDev 6.0, Visual J++ 6.0, MSDN Library Special Edition	The complete suite of Microsoft Visual Tools.	0	
Enterprise Visual Database Tools	Visually design databases and views, and create and test stored procedures for Microsoft SQLServer 6.5+ and Oracle 7.0+ databases.		•
Microsoft BackOffice 4.5 Developer Edition (for Windows NT only)	Build Windows NT-based solution that can be accessed from Windows-based or Web- based clients and integrated in enterprise environment with selected server technologies form the Microsoft BackOffice family. The Deveopment License for Microsoft BackOffice Server 4.5 includes Microsoft SQL Server, Microsoft Exchange, Microsoft SQL Server, Microsoft Site Server, Microsoft Systems Management Server and Windows NT Server.		•
Team Support	Microsoft Visual SourceSafe version control system version 6.0, Visual Component Manager, and Microsoft Repository.		
Application Design Tools	Design multi-tier applications with Visual Modeler.		

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MSS054	Visual Studio Pro 6.0 U/G	\$859
MSS055	Visual Studio Ent 6.0	\$2579
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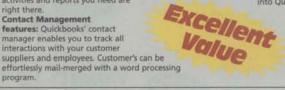
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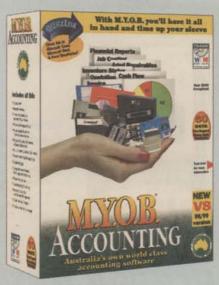
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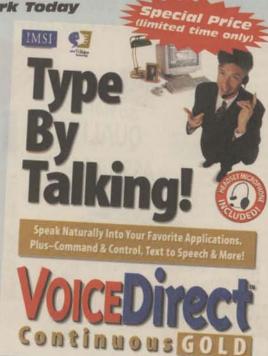
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- · Keyword shortcuts to trigger commonly used phrases, addresses, etc.
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- . Text-to-Speech feature that reads compositions and imported text aloud
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- · Includes Premium noise-cancelling microphone

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- . 32MB RAM for Windows 95 & Windows 98, 48MB RAM for Windows NT 4.0
- . 125MB available hard disk space
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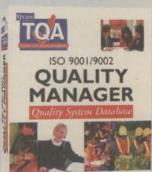
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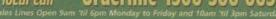
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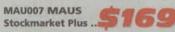
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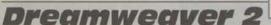
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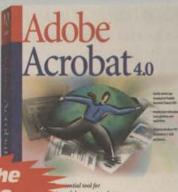
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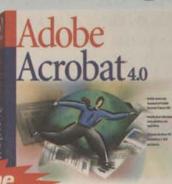
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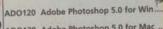
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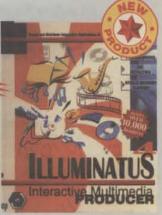
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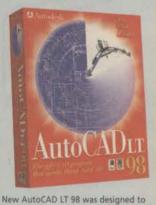
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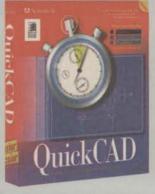
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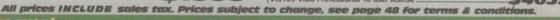
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Get started quickly with an existing layout, or start from scratch using FloorPlan 3D's easy-to-use drawing tools. The multimedia quick tour shows you how. Designing custom walls, stairs and roofs has never been easier.

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FloorPlan highlights just how incredibly powerful and affordable professional-level CAD programs have become PC Review, February 1998

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Key Features:

- Lightscape Technology
- · FloorPlan 3D
- 3D Garden Designer
- HomeStyles Home Design Encyclopedia
- TurboProject Express
- . Home & Office Symbols
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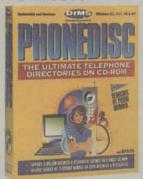
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DDD001 Australia on Disc - Business

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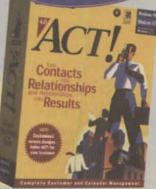
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Norton AntiVi E ci i t i GOId

Norton AntiVirus™ from Symantec is the #1 anti-virus software in the world. SYMANTEC.

New features in version 5.0 let you quarantine infected files, easily get help with viruses directly from Symantec researchers, and it automatically protects you against viruses as well as malicious ActiveX and Java applets.

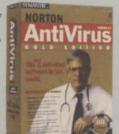
- well as malicious ActiveX and Java applets.

 Quarantine an infected file, and it's safe to store on your computer without fear of spreading the virus. The new Scan and Deliver wizard makes it easy to send quarantined and other suspicious files to Symantec for evaluation. The virus experts at the Symantec AntiVirus Research Center (SARC) will reply swiftly with helpful advice and any needed anti-virus definitions.
- With version 5.0, the software can also detect dangerous forms of ActiveX code, Java applets, and Trojan horses, giving you the industry's most complete protection against malicious code.
- inate new viruses even with

As always, Norton AntiVirus can run constantly in the

background to keep your computer safe from viruses that might come in from a-mail attachments, internet downloads, floppy diskettes, software CDs, or a network. And it can be scheduled to auto retrieve new anti-virus definitions from Symantec as often as once a week.

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the most powerful set of utilities ever created.

The #1 problem-solving software for over

fifteen years

The industry leader in detecting, repairing and preventing major and minor computer

background and provides intelligent repair Prevent crashes and screen freezes three

Optimises your computer to run at peak

times as effectively as any competing

Detects viruses and repairs infected files

 Downloads the latest application patches and drivers over the Internet.

Lets you customise operations, or set Norton Utilities to work continuously

efficiency Detects Windows problems in the

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NOR095 Norton Cleansweep 4.5

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2000

- · Automatically updates database of Y2K compliant software

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- · Bloodhound technology uses advanced heuristic logic

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CleanSweep

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In assessing Year 2000 exposure, don't forget that date anomalies in desktop PCs or applications can cause local problems or spread to the mainframe. Norton 2000 gives you an easy, reliable, and flexible way to address Year 2000 anomalies at the desktop level, in applications, and in system clocks and BIOS.

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- . Supports central installation and administration
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system. The Crash Assistant feature guides you through each crash situation step by step – even offering multiple recovery options to maximise your chances of successfully availing your work. There's no better software than Norton

CrashGuard for recovering from application crashes, application freezes and system crashes.

SYM199 Norton CrashGuard 4...

Cash back With NORTON

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Norton CleanSweepTM 4.5 – recovers disk space by safely and completely removing unnecessary programs and files.

Norton CrashGuard¹⁴⁴ 4.0 – automatically protects against system crashes and screen freezes. It not only minimises the chances of a crash, but in most cases lets you save your work if a crash occurs.

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One solution for every PC problem!Office is the latest addition to the McAfee family of products. Designed to keep your PC running at optimum performance McAfee Office offers the PC user everything they could possibly need to maintain a healthy system. With full versions of VirusScan 4, First Aid 98, Nuts & Bolts 98, Guard Dog, Uninstaller, Year 2000 Toolbox, Oil Change, and Hurricane - McAfee Office offers over \$600.00 worth of value for only \$169.00.

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- . OS Wizard creates the best configuration
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 Creates and resizes partitions with no risk too your data, automatically!
- Universal mouse support

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Solomons Anti-Virus

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With over 3 million users worldwide. 24 hour, 7 day technical support and on-line upgrades for killing new viruses it's no wonder Dr Solomon's is trusted by over 3 million people worldwide.

It's the world's most advanced, trusted and widely used anti-virus program.

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*Computer viruses are increasing at the rate of 300+ per month

Detect and Destroy ALL viruses. McAfee Macro Hunter technology safeguards your PC from all virus types and from all potential sources. Virus Scan stops destructive Active X and Java applets often downloaded from the Internet. It scans all your e-mail attachments right inside your mailbox, so viruses never reach your system. SecureCast prepares you by using Internet "Push" technology to deliver virus updates directly to your desktop, automatically for the life of the product

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Are your valuable computer files protected from dangerous Internet hackers, or from prying eyes when you send them across the Net? Do you want people to be able to track your movements on the Web? If your answer is no, then Speed Surfer's Internet Toolbox is the perfect solution! It's a one-stop quick-fix to all of your security needs. Plus asy onebutton access makes browsing a breeze - no more complicated routines to log on to your favourite Web site.

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Utilities

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Automatically recover and restore lost data!

Your data is priceless. Whether it be the last five years of your financial records or Grandma Brown's favourite recipes, if anything happens to them - like deletion, virus pfection, hardware failure - replacement would be difficult or even impossible. Fortunately, with Lost & Found from PowerQuest, restoring lost data is just a few keystrokes away. Rather than spending thousands of dollars to send your hard drive to a data recovery centre, Lost & Found lets you automatically recover and restore data after accidental (or even intentional) data loss, or from corrupted nedia caused by a disk crash or logical system failure. Our patent-pending technology will even recover data if the partition has been reformatted or if the FAT tables have been destroyed! In fact, as long as your disk is still spinning, Lost & Found can locate and recover almost any file, anywhere on your disk.

What makes Lost & Found an easier, more effective data recovery system?

Unlike other data repair and recovery software solutions, Lost & Found:

- Does not need to be installed prior to the recovery of lost or corrupted files.
- Does not alter, write to or attempt to repair critical sectors on the damaged disk, increasing the chances of a successful data recovery.
- Recovers your files even after reformatting, as long as you have not written over them.
- Performs a disk analysis and reports the odds of recovery via colour coding. Allows you to save data to a network drive.
- Offers exceptional data error handling, allowing you to recover files from disks that have suffered head crashes or other damage.
- . Recovers lost or damaged data even if the critical sectors, such as the boot sector or root directory, are corrupted or missing.
- Recovers data from both FAT16 and FAT32 partitions. Works with all possible IDE, EIDE and SCSI disk-drive configurations.

Common causes of data loss on PCs:

Software

Buggy software Viruses Operator error Software failure Installation glitches Hackers Backup software failure

Hardware

Electromechanical failure Head crash Controller malfunction Power failure Tape-drive failure

Circuit failure CPU failure **Environmental factors** Media damage

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partitions

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PartitionMagic 4.0 makes it easy to run multiple operating systems on the same machine without compatibility problems. Explore the new world of Windows 95,98 or NT while still relying on the security of your current operating system. And PartitionMagic 4.0 includes BootMagic from IBM, making it easy to select an operating system every time you boot your computer.

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Create, resize and delete partitions with the drag of a mouse.

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WHAT THE PRESS SAY ... *Unique, dazzling and indispensable, PartitionMagic is a must have product in an era of

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Create a physically separate partition for your valuable data files to protect them from potentially unstable applications. This simplifies backups, especially to devices like ZIPTM drives. And with the transport feature of Uninstaller™, PartitionMagic 4.0 lets you easily move applications from one

their files and operating system settings in place













POW033 PartitionMagic 4.0 Upgrade

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PKZip 2.6

The Original **Compression Program**

The growth of the internet and the increased use of World Wide Web browsers are creating a greater need to compress data files. Saving disk space and saving on-line phone charges are big benefits of compressing data files with PKZIP.

PKZIP 2.6 has been determined by PC Magazine Editor's Choice (03/98), as the best compression utility. "All the programs reviewed here will get the job done, but PKZIP delivered the best combinations of

reatures - PKZIP compresses files on average 50-70% with many large text and database files compressing well over 90%. PKZIPs simple point-and-click interface lets you easily compress one file, or all files on an entire hard drive, and store them in the ZIP file. PKZIp 2.6 has the added feature of being able to create self-extracting files that span multiple fickettes. multiple diskettes.

multiple diskettes.
Using PKWARE patented compression technology, PKZIP combines the best and fastest compression found in PKZIP with ease-of-use of a Windows program, PKZIP for Windows is compatible with Windows 95, Windows NT, Windows 3.1 and with 2IP files created on other PKZIP platforms. Other platforms include DOS, DSIZ and Open/MS for VAX and Alpha.

Use PKZIP Whenever You Are:

At Home - The Internet contains many .ZIP files you can access through a World Wide Web browser. PKZIP also lets you archive files such as the digitized family photo album or annual budget in ZIP files, saving you space on your hard

WIN109 PKZip v2.6

On the Road - Use ZIP files when sending email, storing presentations, or transferring files

between your office PC and your laptop.

At the Office - Network and system administrators save space on their servers and reduce traffic over the Intranet or corporate network using ZIP files.



The ultimate Companion for **Internet Downloading**

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"Probably one of the wisest investments a savvy windows user can make" WinZIP brings you the convenience of Windows to the use of ZIP files without requiring PKZIP and PKUNZIP. It features an intuitive

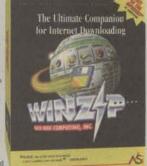
point-and-click dray-and-drop interface for viewing, running, extracting, adding, deleting, and testing files ZIP, LZH, ARU, and ARC

Zipping safely compresses the data in your files, so that your files occupy less space. This allows you to save moretime by speeding up file transfers.

"Zipping reduces the size of files, while "Unzipping" restores the files to their original form, completely unchanged.

Internet Surfers:

WinZip makes it leasy for you to access almost all of the compressed files you download from the Internet. WinZip features built-in support for Zip, TAR, gzip, Unix Compress, UUENCODE, BinHex, and MIME files.



Key Features

- your files by as much as 90%.
- Key Features

 Tight Integration with the Windows 95/98/NT shell

 Drag & Drop to or from the explorer, or ZIP & UNZIP without leaving the Explorer

 Drop files on a printer to print

 With the easy to use tool bar you have the convenience of Windows when Zipping

 Built-in PKZIP-compatible ZIP and UNZIP (PKZIP and PKUNZIP are not required)

 Built-in support for the popular Internet file format TAR, gzip, Unix compress, Uuencode, Xxencoder, HinHex, and MIME

 Simplify file distribution by making files that unzip themselves

 Optional WinZip Wizard Interface

 Works with ARU, ARC, and LZH files

 Optional virus scanning support.

Utility for Windows

WIN119 WinZip 7.0

WordPerfect Suite 8 with Dragon NaturallySpeaking



Corel WordPerfect Suite 8 with Dragon NaturallySpeaking brings together two award-winning products to give you powerful office software, the latest Internet technology and speech-enabled word processing. Because Dragon

With The Original Zipping and Unzipping Utility PKZP

compress

NaturallySpeaking is fully integrated into Corel WordPerfect 8, you can create documents just by speaking to your computer!

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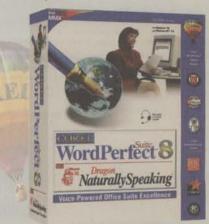
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Y2K

FIND IT CHEAPER? CALL US - WE WON'T BE BEATEN!*

So you know what the millennium bug is. What next?

The Millennium Buster range has been developed to meet the standards as defined by the British Standards Institute Code of Year 2000 Conformity (DISC PD 2000-1). This code has been adopted word for word by Standards Australia and Standards New Zealand (SAA/SNZ MP77:1998), so you can buy with confidence.

TEST



Why pay for a Year 2000 fix if you don't need one? Use the Millennium Buster 1 test program to see if your PC is Year 2000 compliant. The Millennium Buster 1 test program will check ALL of a PCs' time keeping components, including:

- Operating System Clock
- · BIOS Chip
- * Real Time Clock (RTC) Chip

It will test for Year 2000 compliance as well as testing for leap year recognition. At only \$29, can you afford not to test your PC?

Multi User Call for pricing

Single User MIL100

FIX



If you have performed the Millennium Buster 1 test, and have found that you need a software fix, then Millennium Buster 2 is the answer. Again, Millennium Buster 2 works with ALL PC time keeping components. There are very few programs that work with a computers' Real Time Clock. Millennium Buster 2 does, as well as working with leap year recognition. Installing new software? No problem. With the in built Re-Test option, you can check your PC as often as you like.

Single User MIL101

Multi User Call for pricing

CORPORATE



MBNET - the Millennium Buster Client Server program for experienced network administrators. MBNet contains both the test and the fix, which can be run on all workstations from the server. For more information, please call our Major Accounts team on 1 300 300 003.

5 User Client Server MIL102

Call for extra

NEW HARDWARE FIX!

What if you want a hardware fix to make you Year 2000 compliant? You could spend \$3000 on a new PC, but it may not be compliant. You could spend \$700 on a new motherboard and processor, but again it does not guarantee compliancy, and also means that you will have to re-install all your hardware, drivers etc. Or you could spend \$595 on the Millennium Buster Year 2000 Enhancement Card. The Year 2000 PC Enhancement Card is a highly sophisticated card that utilises the latest Dallas Semiconductor fully Year 2000

Card is a highly sophisticated card that utilises the latest Dallas Semiconductor fully Year 2000 compliant Clock Chip. An ISA card that installs in most PCs in approximately 10 minutes, it is recommended for use in network servers and mission critical PCs.

MIL103 Millennium Buster PC Enhancement Card

Call for volume pricing

ATTENTION I.T. MANAGERS: Worried about the millennium bug and your network? Call our major accounts team on 1 300 300 003. Millennium Buster is used by many Blue Chip organisations.

YEAR 2000 - AN OPEN LETTER TO OUR VALUED CUSTOMERS

If you're confused, I'm not surprised. There is so much hype surrounding the year 2000 problem that it's often difficult to navigate your way to an honest conclusion. Briefly, let's start with what it's not: it's not a hoax. It's not being made up by the computer industry to sell more computers and software, and it's not exclusively the computer industry's problem. And it is certainly not going to go away.

As one of the leading mail order suppliers of PC Software and peripherals in both Australia and the UK, International Software Warehouse is committed to working with our customers in addressing the challenge of the Year 2000 millennium date change.

The challenge relates not only to shrink wrap software packages that are reliant on 4 digit short cut dates, but to the underlying IBM PC compatible hardware Bios (Real Time Clock CMOS) and Operating System compliance.

International Software Warehouse is currently working with its suppliers in following the guidelines set by Standards Australia and Standards New Zealand (SAA/SNZ MP77:1998), who have adopted the British Standard Institute's Document DISC PD 2000-1 verbatim. This code dictates that the onus is upon the manufacturers of computer software to ensure that the programs are compliant.

As part of our commitment to providing our customers with the very highest level of service, we have produced a free brochure explaining the implications of the Year 2000 challenge to small and large businesses alike. In the brochure you will find the necessary advice, tools, products and services with which your organisation can effectively implement Year 2000 risk assessment and compliance before December 1999. For a copy of the brochure, call our Major Accounts team on 1

Mi Webb.

Phil Webb Managing Director International Software Warehouse



the implications of the Year 2000 Challenge, and how to deal with them. Kodak CD-R Discs \$2.70 each Traxdata/



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you to take another look You will find it has dramatically. More information more importantly, more great products, all at the best prices. Whether you are make sure you pay us a

The Ultimate tool for beating the Millenniu

Check 2000 PC Deluxe is the only integrated year 2000 testing tool that addresses all five "at-risk" layers of your PC. You can correct the BIOS, test the operating system and software programs, scan your data files, and flag data importing issues.

CHECK 2000 PC Deluxe gives you more:

- Finds and corrects year 2000 hardware (BIOS) problems on the
- ✓ Flags problems in software programs, includes the world's largest database of remediation advice
- Lets you check new data from e-mail, internet, disks, CDs and other outside sources as often as you like
- Scans all the way down to individual cells in spreadsheets, databases, and other data files
- ✓ Helps you prioritize software and data problems for timely repair

"Today CHECK 2000 is established as the standard by which other year 2000 products are measured" Microsoft Y2K Resource Centre.

Greenwich Mean Time



Greenwich Mean Time

STOCKCODE: GREOO2

1 Test and Correct BIOS

A simple pass/fail screen tells you if your BIOS passes or fails the critical date tests. Then Check 2000 PC Deluxe will correct the problems for you in 98% of BIOS types.

2 Check your operating System

Check 2000 will test your operating system, identify any 2-digit settings, and then recommend the changes you need to make. We check all of the popular operating systems, including: Win95/98, NT 4.0.

3 Analyse Software Programs

Every application treats date-dependent data a little differently. Check 2000 PC Deluxe will do an inventory on your application programs - and show you which programs are most at risk (usually it's spreadsheets, databases, and schedulers). Year 2000 advice is provided on over 5,000 software programs. The knowledge base built into Check 2000 PC Deluxe recognises over 20,000 programs.

4 Pinpoint and Prevent Data Problems

Drill all the way down to the individual cells in spreadsheets- and other data files-that could cause problems. Correct the data as it's revealed to you by Check 2000, without switching between software programs. You can run the Data Scanner at any time, to continually reveal any new date-dependent data that comes into your PC.

5 Keep Checking Imported Data

Check 2000 PC Deluxe Identifies software programs that import and export data. Then Data Scanner finds date-dependent data so you can correct it

IECK 2000



PC problems

Fixes your hardware

Analyses your software

Provides detailed advice

What CHECK 2000 PC does for you:

- · Finds and eliminates hardware date problems in 98% of BIOS types by correcting the PC BIOS system clock.
- Tells you how your data and software will be affected by the year 2000 changeover.
- Gives advice on avoiding problems inherent in many thousands of popular software programs.
- Helps you prioritise software and data problems for timely repair.
- Lets you run the program as many times as you like to keep monitoring your your PC's year 2000
- Provides free technical support for 90 days.

Compatible with Win 3.1/3.11, Win 95, Win NT 3.x, Win NT 4.0. Flags and fixes year 2000

GRF001

Scans your network to find and fix Year 2000 PC problem

- Only Check 2000 Client Server does all this and more · Performs a detailed hardware and software audit of your network
- Scans spreadsheets and databases for year 2000 problems, drilling down to individual cells
- · Finds and Fixes critical (BIOS) problems on your network
- · Collates network data into one common database Supplies a top-down view of your year 2000 readiness
- Provides detailed reports for all levels of your enterprise, form management to technical
- Prioritizes software and data problems for timely
- Offers ongoing risk assessment to maintain your protection, as you change and add to your network.

The client server software will run on the following operating systems: DOS, Win 3.1x (including for workgroups), Win 95 and Win NT 4.0



GRE005

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powered by ATI's Rage 128 graphics technology, with an astounding 32Mb of memory. Ideal for serious game players and for graphics intensive applications such as 3D CAD, this card also feature hardware DVD for full screen DVD playback. For full specifications, check out our website at www.iswh.com.au Things never looked so good!

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32Mb	7ns	\$89	MEM100
64Mb	7ns	\$189	MEM101
128Mb	7ns	\$379	MEM102
PC100 ECC SDRAM DIMM (168 pin)			
Size	Access Time	Price	Stock Code
128Mb	7ns	\$389	MEM103
SDRAM DIMM (168 pin)			
Size	Access Time	Price	Stock Code
32Mb	10ns	\$89	MEM104
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INT131	\$169
INT132	\$239
INT133	\$329
INT134	\$389
INT135	\$149
INT136	\$169
INT137	\$219
INT138	\$299
	INT130 INT131 INT132 INT133 INT134 INT135 INT136 INT137



Pentium II Matrix

Chip	Stock Code	Price
Intel Pentium II 350 512k cache	INT140	\$439
Intel Pentium II 400 512k cache	INT141	\$749
Intel Pentium II 450 512k cache	INT142	\$1229
Intel Pentium III 450 512k cache	INT143	\$939
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5829

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that it will be secure for up to 100 years. Or create CD5 that can play in millions of CD-ROM and Audio CD players worldwide Read : 6x Write: 2x



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- Adapte Enerch Co drag and drop files to CD from
 Windows Explores or save directly from any application
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 Windows NT, Windows 3x, Macintosh and UNIX operating systems.
 Adaptec Easy CD Audio Create music CDs
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The fastest, easiest way to make your own CDs.

With up to 24X read speed and up to 4X write speed, the new HP CD-Writer Plus 8100i offers unprecedented performance in CD-Recordable technology. Now, in addition to being able to create your own CDs as simply as using floppies, you can do it faster. What's more, the HP CD-Writer Plus 8100i lets you read CDs at speeds rivalling 24X CD-ROM drives. And now there's no more

long waits to format your CD-RW discs. With HP fast format, formatting CD-RW takes less than five minutes, saving up to one hour or more. From start to finish, the HP CD-Writer Plus 8100i is designed for high 6 performance

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- . Drag and drop files to CD or save directly to CD from any application
- · Improved Performance! Read at up to 24X; Write at 4X speed; ReWrite at 2X
- * World-class quality and support from Hewlett-Packard, the most trusted name in computer peripherals

HPP031

- Software Bundle Features:

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- HP Disaster Recovery Helps you quickly restore operating systems, custom software settings, and data files on your hard drive
- HP Simple Trax Helps you back up your files to CD, and then makes it easy for you to quickly locate and retrieve them. Without having to insert the CDs, you can determine which backup CD contains the file you need.

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For more information on which drive is right for you, contact our sales team on 1300 300 003

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IOM022 Zip Drive External (Parallel port)	
IOM020 Zip Drive External (SCSI Port)	\$239
IOM095 Zip Internal ATAPI	\$199
IOM096 Zip Starter Kit (Parallel port)	\$289

*100MB capacity where 1MB=1million bytes. The capacity reported by your operating system may differ.





The storage Jaz 2GB drives and disks offer the ideal solution for storing, transporting and playing multimedia applications. Speedy access times and rapid transfer rate mean you can quickly and easily move files around. The Jaz drive can handle even the most demanding applications, including full-screen full motion videos!



IOM083 JAZ 2GB Ext

IOM082 JAZ 2 G8 Int.....

Seagate Tape Backup



TRAVAN 4 - 8Gb Features hardware compression and read while write. Backs up to 60Mb per minute*. The unit installs easily, and comes with a 2 year guarantee. The kit also includes Seagate Backup Exec and a free bonus tape to get you started.

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5EA141	Internal SCSI Kit
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SEA155	5 pack of Travan tapes\$259



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AVERAGE LATENCY	6.67msec	5.56msec	5.56msec	5.56msec	
SPINOLE SPEED	5400RPM	5400RPM	5400RPM	5400RPM	SEA162 Seag
DATA BUFFER	128K	128K	128K	128K	
FORM FACTOR	25.Amm	25.4mm	25.4mm	25.4mm	SEA164 Seag
PIO BURST (MB/S)	MEE OT 9U	UP TO 33M	UP TO 33M	UP TO 33	100 100 100 100 100 100 100 100 100 100
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Fireball EX 10.2Gb	QM310200EXA	5400rpm	9.5ms	\$439	QUA171			
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Drive	Model	Transfer Rate	Access Time	Price	Code
Atlas III 9.1Gb Wide Ultra	QM309100TDLW	80Mb/sec	7.5ms	\$829	QUA172
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- . 15 inch FST,
- * 0.28mm dot pitch,
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- * 1280 x 1024 @ 70Hz max NI

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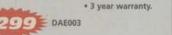
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Key Features:

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 32MB built-in flash memory
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- cards
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50 fields/sec

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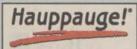


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ASS001 PSC 1106 ..



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WinTV-Primio, WinTV-PCI and WinTV-Radio PCI Boards give you live video-in-a-window!

Hauppauge's WinTV Boards are single slot PCI cards with 125-channel TV-tuners. The TV-source can be from aerial or cable set top box TV. With the external audio/video inputs, you can also connect to a satellite receiver or VCR, camcorder or video camera. The WinTV Boards also extract Teletext data from the TV signal, and include VTPIus, the Professional Teletext software. These PCI boards connect to your cable TV or to a TV antenna, and display live TV in a resizable window. They do this by digitising the live video (from either the built-in 125-channel cable TV tuner or the external video- input source) using high quality 4:22 video external video input source) using high quality 4:2.2 video sampling. The digitised video is sent over the PCI bus into the memory of a VGA display adapter, a technique which makes the WinTV PCI boards easy to install and gives a great looking TV

The WinTV-Primio, WinTV-PCI and WinTV-Radio support Intercast data reception and Teletext data reception. Included is our VTPlus software, for multiple teletext page display and DDE (dynamic data exchange). While live video is being displayed, these boards can also

extract either intercast data (Channel 7 in Sydney and Melbourne) or teletext data from the TV signal.







The WinTV PCI boards have these great features:

- Live TV-in-a-window on VGA monitors from 640 x 480 to 1600 x 1200 pixels in up to 16 million colors- unique to WinTV. Built-in cable ready TV tuner: a 125-channel TV tuner with
- automatic channel scan Resize the WinTV window from icon size to full screen (or any
- Auxiliary audio/video input connects to video cameras, VCR's and camcorders.
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HAU001 WinTV-Primio (with PAL B/G tuner and teletext)

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HAU003 WinTV-Radio (with PAL B/G tuner, teletext, FM Radio, intercast)

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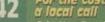








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AHA1542CP KIT †	ISA	DMA	Yes	Yes	Up to 7	SCSI 1.2 Fast SCSI	SCSI	Up to 10Mb	All OS**	ADA056	\$575
AHA2940PCI	PCI	DMA	No	Yes	Up to 7	SCSI 1,2 Fast SCSI	All Standard SCSI	Up to 10Mb	All OS**	ADA057	\$415
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AHA2940UW KIT 1	PCI	DMA	No	Yes	Up to 15	SCSI 1,2 Fast Wide Ultra	All Standard SCSI	Up to 40Mb	All OS**	ADA059	\$589
AHA2940UZW KIT †	PCI	DMA	No	Yes	Up to 15	SCSI 1,2, Fast SCSI, Fast Wide, Ultra SCSI, Ultra Wide, Ultra 2,	All Standard SCSI	Up to 80Mb	Win NT4.0 & 5.0, Win 95, NetWare 3.1x & 4.x SCO UnixWare 2.1.2, OS/2 Warp 3 & 4 and SCO Unix 3.2v4.2	ADA051	\$749
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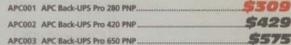
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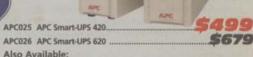


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Networking

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In today's communication, networking means connecting people together at work, at home and on the move, creating a world of information at every one's fingertip and affordable to every one.

D-Link, a leader in workgroups' communication, provides integrated solutions that guide you on the fast track to the most economical and dependable way of networking. Products range from intuitive adapters for desktop connectivity, to handy network cards for mobile users and high-speed devices for seamless Internetworking. Coupled with a global presence, D-Link is committed not only to providing powerful networking tools but also to customer satisfaction with ontarget consultation and service throughout five continents.

Ethernet PCMCIA

DMF-560TX

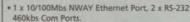
PCMCIA 10/100Mb LAN & 56k Modem PC Card

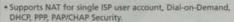
- * 10/100Mb Auto Sensing LAN Port
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- * Rockwell Chipset
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- . Concurrent use of LAN and Fax/Modem.
- * Simple plug and Play installation
- Supports Windows 95/98/NT and others
- Fully approved A-Tick and C-Tick

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2 port Internet ready Server for SOHO Networks





* Dual use of Com ports for double bandwidth. Support for Analog modem or BRI ISDN TA.

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8-port 10/100Mbits Dual Speed Hub with Switching. Stackable

- * Unmanaged 8 port Nway Dual Speed Hub. Stackable up to 5 units or 40 ports.
- *8 x RJ45 ports to support CAT3,4,5 for 10Mbit connection, CATS for 100Mbit connection.
- Internal switch module to connect 10 and 100Mbit backplanes.



DFE-916x/N

16-port 10/100Mbits Dual Speed Hub with Switching, Stackable

- Unmanaged 16 port Nway Dual Speed Hub. Stackable up to 5 units or 80 ports.
- 16 x RJ45 ports to support CAT3,4,5 for 10Mbit connection, CATS for 100Mbit connection.
- Includes switch module to connect 10 and 100Mbit backplanes. Can be managed by DFE-2624iX



DLK012

Ethernet Interface Adapter DFE-530TX

PCI-bus 10/100M Fast Ethernet Network Interface Card

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. Optional remote boot rom. Certified driver for Netware, SCO Unix, Windows 95. Windows 98 and Windows NT.

DLK004 DMF-530TX 10/100 PCI Network Card

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Includes V.90 ITU 56K standard and x2 technology

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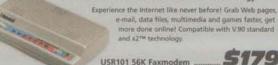
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Stock Code:USR104



3COM U.S. Robotics 56K* Faxmodem

Includes V.90 ITU 56K standard and x2™ technology



USR101 56K Faxmodem ...

*Can receive at up to 56 Kbps, send at up to 31.2 Kbps. Due to FCC regulations, receiving speeds limited to 53 Kbps. Actual speeds may vary. Requires compatible phone line and server equipment.

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3Com's new range of 56Kbps V.90 standard desktop moderns - the 3Com U.S. Robotics 56K V.90 External Professional Message Modern and 3Com U.S. Robotics 56K V.90 External Message Modem - enable users to meet all of their data, voice and message management needs with a single product, guaranteed to provide an enhanced and productive Internet experience.

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- Easier installation and use
 Software upgradeable for future
- * Backed by a Lifetime Limited
- Warranty

 Valued-added Connections CD-ROM Software

USR105 56K External Professional Message Modem



3Com U.S Robotics 56K External Message Modem

- Faster Internet access
 Remote retrieval of voice messages through a dial-up connection
- · Software upgradeable for future enhancements
- Backed by a Lifetime Limited
- Warranty

 * Valued-added Connections CD-ROM
- * Easier installation and use

USR106 56K External Message Modem....

Diamond Voice 56K modems are an ideal choice for all internet, voice, data and fax applications. Currently available in external and internal (OEM) versions, they provide internet download speeds of up to 56 Kbps* using the proprietary Rockwell K56flex standard.

The modems are flash memory upgradable to the recently ratified ITU-T V.90 standard via an easy to use Update Wizard.

Cheyenne Bitware communications software for Windows 3.x, 95 and 98 is included with each modem, allowing it to act as a fax machine, an answering machine and a data communications terminal. Faxing and voice messaging is made easy using Cheyenne Bitware and the modem's voice capabilities. A convenient stereo multimedia headset with an attached microphone is also included providing hands-free operation of the PC while telephone calls are made or received answering machine messages are reviewed.

Diamond Voice modems are also backed by a 5-year warranty and a toll-free Technical Support number, 1800-640-667.

Minimum System Requirements

- · Computer with i486 processor (Pentium recommended)
- . 8 MB RAM (16 MB
- recommended)
- High speed port -16550 UART required for communications above 19,200 bps (External modem only)
- Microsoft Windows 3.1, 95 or 98 for communications software
- . CD-ROM drive for communications software installation









Includes

- . Diamond Voice 56 Modem
- · Multimedia stereo headset with microphone
- . Telephone line cord
- · Serial cable (dual 25 pin and 9 pin External modem only)
- 12 volt AC power supply (External modem only)
- * Installation and Setup manual
- . Technical Users Manual containing AT command reference section on CD-ROM
- Chevenne Bitware for Windows 3.x, 95 and 98 (on CD-ROM)
- Windows 95/98/NT driver on 3.5" floppy disk
- . 50 Hour free internet offer from



OFF010 Mitsubishi Diamond Voice 56K Modem (Internal)...

OFF009 Mitsubishi Diamond Voice 56K Modem (External) ...5139

* For data download speeds above 33.6 Kbps, you must be connected to an Internet Service Provider (ISP) that supports the same protocol as the modem, either K56flex or V.90. The actual connection speed may vary with the telecommunications carrier line quality conditions in your area.

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- · A radical new shape for optimum audio performance



AUZ134 Banksia Wave 33.6 SP Fax Modem

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BAN056 Banksia PC Card 56K

BAN060 Banksia Combo Card 56K + 10BASE T Ethernet Adaptor

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NetComm CardModem56

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Features:

1+2 Warranty - NetComm's 1 year warranty, with an additional 2 years parts and labour upon registration.

Ready to Travel - a built-in interface that's designed to be approved in a variety of countries around the world Rockwell K56flex - used to achieve superior quality in the

latest telephone exchange technology

Super Reliable - specially designed for people on the move, so we've ensured it is robust enough to survive even the most punishing use

GSM Capable - achieve maximum flexibility with the option of both GSM and standard telephone line connection with high speed fax/modem capability

Your NetComm CardModem56 Global package contains the following items: CardModem56 Global, telephone line cord and warranty card. Plus communications and Internet software, modem drivers and manuals. Drivers are included for Windows 95/98, Windows NT, Windows 3.1x, MS-DOS and many third party applications. (GSM connection cables sold separately). A Global utility disk for international access.

- IMPORTANT 56Kbps is a download proprietary standard only

 - 56Kbps download speeds are subject to telecommunication carrier service
 33.6Kbps is the maximum upload speed
 To achieve 56Kbps the Internet Service Provider you are connected to must use the same proprietary standard

STOCK CODE: NETO30

NetComm Roadster II 56 Voice, Fax Data Modems

Using the latest telephone exchange technology, the NetComm Roadster II 56 voice, fax, data modems deliver much greater speed. So now the World Wide Web is made much more exciting - with super fast downloading of graphics, games and multimedia.

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STOCK CODE: NET138





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Note: 56Kbps is a download speed only, 33.6 Kbps is the maximum upload speed. Download speed are subject of telecommunication carrier STOCK CODE: NETO28

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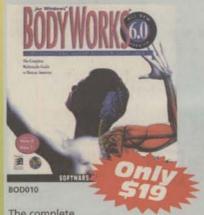
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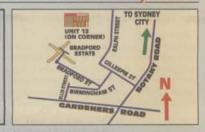
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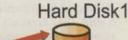
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After Hours

186 APC Magazine

BIBLIOFILE

If you have questions about Web services, digital photography, Mac OS or PC hardware, you'll find some answers here.

Questions and answers

Buying Web Services

This is a businesslike guide about how to choose and pay contractors to build your Web site and it is appropriately subtitled 'The survival guide to outsourcing'. Unfortunately, the author wrote the book solely for a US audience, which means Australian readers will be alienated by the many North American examples and the assumed scale of the marketplace. Legal information and advice on expenditure decisions and resource availability contained in Buying Web Services do not necessarily apply in Australia.

On the other hand, it's cheaper to buy Web space in North America and, thanks to the Web's lack of borders, many Australian businesses do just that. There are also plenty of chapters with useful, if rather dry, information that can be applied to the local market to help you avoid the cowboys.

While JP Frenza is credited as the author, his main task is to introduce a collection of essays by individuals who have been involved in the Web building process or on its periphery. There are also transcripts of round-table discussions between them. The emphasis is on maintaining coordination with Web contractors to minimise the risks of creating a dud site. Frenza's background is in non–profit businesses, so you can be sure plenty of attention is paid to affordability.

The book makes some good points about whether certain businesses are really ready for a major online presence, and



about the pros and cons of inhouse Web development. It's hard to recommend a book that's so focused on a foreign market. Still, it's good to see someone tackling Web outsourcing as an important issue on its own, rather than just incorporating such advice into a Web development title.

Simon Vandore

■ Author	JP Frenza
■ Publisher	Wiley Computer Publishing
■ Distributor	Jacaranda Wiley
■ Phone	(02) 9805 1100
■ Price	\$85
■ ISBN	0-471-31289-4
■ Rating	***

Guide to ratings

*	Sydney summer: You must
	be joking
**	Louise Sullivan: Just gets away with it
***	The IOC: More to it than meets the eye
****	King Abdullah: Trying to fill leader's shoes
*****	Natalie Imbrualia: Best of British

Digital Photography Answers!

The subtitle for this book is 'Certified tech support'. Sadly, it isn't quite clear which is the certified aspect: the book, the author or the answers? Who knows?

The confusion continues. The cover strapline claims you get a whole book of

answers for less than the price of one support call. Now support calls may be expensive in the US, but \$US24 for one call seems a bit steep.

To be honest, the emphasis on the US market once again throws this title a bit askew for locals. Camera prices, photo services, copyright and even certain model information are simply not applicable in Australia.

But the book is well laid out with a sensible progression through camera choice and use, to subject, lighting and peripheral choice, as well as storage, editing, Internet use and printing. And there is plenty of material. Over 500 pages with lots of illustrations, tips and diagrams. Some of the photo reproduction is very grainy, however, and not at all useful for illustrating the fine changes of detail explained in the accompanying text.

All the chapters start with a brief introduction, before plunging straight into Q&As. The advantage of this approach is that there are direct answers to many of the niggling problems related to matters such

as subject placement, image correction and file exchange. But in terms of learning about how digital cameras work, their use and making the most of the bundled software, this approach is less satisfactory than an explanatory chapter with a how-to roundup at the end.

Overall, a useful textbook for courses teaching the basics to potential digital photographers. For those who already have a digital camera, it isn't great value. Jeremy Torr

■ Author	Dave Johnson
■ Publisher	Osborne McGraw-Hill
Distributor	McGraw-Hill Book Company
	Australia
Phone	(02) 9415 9888
■ Price	\$44.95
■ ISBN	0-07-211884-9
Rating	**

Mac OS 8.5 Black Book

To some extent, this book is more of a Macintosh title than a Mac OS one. For example, it discusses the types of RAM needed in different models, and there's a catalogue of Macs from the original model to the beige G3s.

Each chapter provides a discussion of its topic, presents relevant technologies and products, and then delivers answers to specific questions such as how to share files and folders.

Overall, the range of material is comprehensive, but some important information is omitted. For example, readers are warned that a clean Mac OS reinstallation involves the tedious job of moving items from the old System Folder to the new, but there's no mention of the tools, such as MOSH and Conflict Catcher, which ease the process.

There is some very useful material on Mac/Windows integration, so it is understandable that DAVE (software providing Windows-style networking for Macs) is discussed and PC MACLAN (AppleTalk networking for Windows) is not. However, MACLAN does deserve a mention.

There's plenty of material about PowerBooks, Internet server applications, AppleScript and Java, and the accompanying CD-ROM carries a good selection of useful utilities and applications.

The list of error codes isn't much use. Other parts are more useful, such as the OT/PPP errors (for instance, -7111 means 'the password is invalid'). The guide to HTML could be useful, but seems out of place in this book.

Stephen Withers

Mark Bell and Deborah Suggs
Coriolis
Woodslane
(02) 9970 5111
\$79.95
1-57610-304-8

Understanding Personal Computer Hardware

Understanding Personal Computer Hardware is aimed at people who are only basically computer literate but hunary to know more. From inception to layout, this title is more a reference work than an easy-to-follow guide to computer hardware.

Explanation of topics is extremely detailed, and backed up by a series of hardware and software-related experiments, although how many people will benefit by using debug to make their PC speaker warble is debatable. Some of the

experiments are also reliant on a copy of QBasic, which even the author notes isn't shipped with any Windows 95 version. The book's verdict? Oh well, you won't be able to do those experiments. Too bad.

What makes the book a worthwhile purchase is its in-depth examination of topics that a lot of other guides to computer hardware skip over. Everything from parallel port standards to the physical characteristics of hard drives and beyond is examined in minute detail. This is great for reference purposes, but not so good if you're simply looking for details on the basic differences between SCSI and EIDE drives. The illustrations are well done, if a little basic - it may be hard to match some of the simpler diagrams with the variety of hardware out there.

For a guide that promises "Everything you need to know" it certainly delivers, but sorting out those sections you really do need to know from the wealth of detail could be a bit of a chore.

Alex Kidman

■ Author	Steven Roman
■ Publisher	Springer
■ Distributor	D A Books & Journals
Phone	(03) 9873 4411
■ Price	\$64.50
■ ISBN	0-387-98531-X
Rating	***

Correction

In the March issue of Bibliofile, the price and ISBN for The Australian Internet Book were published incorrectly. These should have been \$39.95 and 1875889116. Also, the ISBN for ISP Survival Guide should have been 0471314994. Our apologies for any inconvenience.

Off the Shelf

On the blen						
Title	Author	Publisher	Distributor	Phone	Price	ISBN
The iMac for Dummies	David Pogue	IDG Books Worldwide	Woodslane	(02) 9970 5111	\$39.95	0-7645-0495-9
SAP R/3 System Administration	Liane Will	Sybex	Woodslane	(02) 9970 5111	\$99.95	0-7821-2426-7
Master Photoshop 5 Visually	Ken Milburn	IDG Books Worldwide	Woodslane	(02) 9970 5111	\$89.95	0-7645-6045-X
Client/Server Survival Guide 3/e	Robert Orfali, et al	Wiley US	Jacaranda Wiley	(02) 9805 1100	\$85.00	0-4713-1615-6
The Complete Network Upgrade and Maintenance Guide	Mark Minasi, et al	Sybex	Woodslane	(02) 9970 5111	\$109.95	0-7821-2259-0
Networking Home PCs for Dummies	Kathy Ivens	IDG Books Worldwide	Woodslane	(02) 9970 5111	\$54.95	0-7645-0491-6

Perspective: Netting the future

Digital Property: Currency of the 21st Century

Determining the value of intellectual property has long been a source of bewilderment. Why, for example, was Microsoft prepared to pay \$4 million for the rights to the Rolling Stones' 'Start Me Up' to launch Windows 95? How was that figure derived? It was certainly evidence that there is tangible value in intangible property.

In her book, copyright and LESLEY ELLEN HARR new media lawyer Lesley Ellen Harris attempts to address the impact of digital property - or what she refers to as the "coming of age of intellectual property" - on business, home and recreation. The result is an excellent introduction to this new world, and the issues surrounding the purchase, sale and value of digital property.

Introduction is the key here. Harris wrote this book for those who are looking for clarity and an understanding of how to leverage entrepreneurial opportunities on the Internet. She does not claim the book is suitable for those with an intimate understanding of the digital economy, nor does she attempt to address issues at this level. Digital Property provides a philosophical discussion on the value of digital property, and offers simple quidelines on selling, licensing, piracy, legal protection and copyright.

There is also an abundance of useful Web site references throughout the book. The preface notes that while every effort has been made to keep the book as current as possible, it is likely that many URLs will no longer be valid, and recommends using a search engine to locate similar sites. A noteworthy acknowledgement. To address the issue, the author maintains a Web site to allow readers to access the latest updates.

I have only two criticisms. First, chapter six includes a series of quizzes on copyright law to help you determine your knowledge level. After completing the questionnaires, I was disappointed to find that the answers were not provided. While Harris claims the chapter will provide you with the underlying principles to answer the questions yourself, I found it falls far short, and I am still left with a number of unanswered questions. One example in the book is, "Who owns the

work in a computer program written by a freelance programmer, adapted by an employee, then licensed to a sister company

> who then converts it to another computer language?" I'm still none the wiser. The second criticism is that the sequence of the chapters is illogical.

Overall, however, Digital Property is an easy-to-read, entertaining book. This even applies to the legal sections - which is commendable considering the book was written by a lawyer!

Cathie Kennedy

■ Author	Lesley Ellen Harris	
■ Publisher	McGraw-Hill	
■ Distributor	McGraw-Hill Australia	
■ Phone	(02) 9417 4288	
■ Price	\$29.95	
III ISBN	0-07-552846-0	

The Soft Edge

evolution, but it isn't

always successful.

■ Rating

In The Soft Edge, subtitled "A natural history and future of the information revolution", author Paul Levinson compares the development of media and information technology to an evolutionary tree. It started with the invention of the phonetic alphabet in ancient Egypt, and has evolved to print and hypertext, and will possibly rise to the use of artificially intelligent robots in space. Darwin's theory of natural selection is frequently used as a metaphor for cultural

R PAUL LEVINSO Media, Levinson argues, have been 'selected' by humans to become more like human experience and more democratic. While all consumers of speech, the fundamental human communication system, are also its producers — we can talk back - this is not true for writing. The invention of writing alienated vast numbers of people from its production and consumption, and allowed hierarchies to emerge which controlled access to the reading and writing of text. The invention of the telephone went some way to restore the interactivity of speech (dialogue), even over long distances. The invention of word

processing and the Internet have allowed text to become just as interactive as speech — members of a newsgroup can consume and produce text effortlessly. At the top of this evolutionary tree is artificial intelligence.

Levinson argues that new media often have unintended consequences, unforeseen by their inventors, and can even be revolutionary. The printing press is the most obvious example, as it broke the Church's monopoly on literacy, and enabled the Enlightenment institutions of science, nation-states and capitalism. New ideas, he argues, require supportive environments in order to survive and drive cultural evolution. Luther's heresy that people should read the Bible for themselves had been said before, but it was only successful when the printing press made copies of the Bible more accessible. New media have always been seen as threatening: "new information technologies are routinely castigated as debauchers of earlier informational styles and values". This was as true of the printing press as it is of the Internet.

The current debate about Internet censorship is compared to weeding a garden: can weeds be controlled without damaging the flowers? Levinson argues that the weeds' fate should be decided directly

by the people, not by

governments. However, as ecologists know, weeds are simply plants out of place escapees from gardens or agriculture which thrive in disturbed areas like roadsides - and are less common in stable ecosystems. Although applied inappropriately, the weed metaphor suggests another reading of the history of media. Is it possible that weeds (heresies) can emerge more easily in disturbed zones (new media), and

even form the canopy (become dominant) as the ecosystem stabilises? If so, the fate of old publishers and broadcasters moving online will be interesting viewing.

Glenn Phillips

■ Author	Paul Levinson
■ Publisher	Routledge
■ Distributor	Jacaranda Wiley
■ Phone	(02) 9805 1100
■ Price	\$32.95
m ISBN	0-415-19772-4
III Dating	4444

Sex, science, spelling and a good sinking can all be found in Interactive this month

A life on the ocean wave

James Cameron's Titanic Explorer

This CD-ROM is a superb example of Fox Network's cross-promotional skills. Having cashed in big-time on the film, the Fox Interactive team has put together a CD that plays extensively on the film's appeal - and to be honest, I was expecting a mere clone that added little to the Titanic's biography.

But instead of simply slapping some film scenes and a little voice-over on a CD. the authors have comprehensively researched the events preceding and following the tragedy. Even more impressive is that it doesn't mention Leonardo DiCaprio even once. Bravo!

Inside the very slickly produced box nestles a useful instruction booklet and a three-CD pack, which boots up with a slightly fussy menu interface and a picture of the great lady herself. The discs split the story into three sections — the first sets the scene of the 'Golden Age' of travel, followed by the actual collision and sinking of the ship, and the last disc tells of the rescue and subsequent inquiries and consequences. There is a lot of film footage masquerading as reality, but the depth and accessibility of the subject matter is beyond reproach.

The screen layout is better than average, with a cinemascope-style widescreen video area topped and tailed by menu options and buttons for the numerous cross links - much better than the usual 'window in a window' layout. If you saw the film this is a superb adjunct, and well worth the asking price.

Jeremy Torr



■ Publisher	Fox Interactive
■ Distributor	Electronic Arts
■ Phone	(02) 9955 7744
■ Price	\$49.95
■ Requires	Pentium 166, Windows 95, 16M RAM, 4x CD-ROM drive, 30M
	hard disk space, SVGA
Rating	****

Pinball Science

Pinball Science casts you and your child on a mission to reinvent the wheel . . . and the spring, the flipper, and, for some reason, the woolly mammoth. It all aids the great inventor, who has unfortunately become trapped in orbit around the moon. The only way to save him is to recreate his "great works", in this case, three enormous pinball tables.



In order to create the pinball tables, you have to find out how they work. This involves researching the individual tables' components and then answering a science-based question on the item in question - there's an awful lot of elementary physics involved. Research all the items on a given table, and the table is yours to play according to your own design. Get all three tables, and you free the great inventor.

Pinball Science has been put together exceptionally well. You can choose difficulty levels when you begin the game, so younger children can have as much fun as older ones, and at the same time get basic scientific principles drilled into them. The voice explanations are clear, and the accompanying animations (mainly of the great inventor's pet woolly mammoth) are cute. It's actually quite easy to manufacture the first table, which is useful as a hook for further explanation, and most of the questions are well organised and phrased.

You are also given some choice as to where the pinball features (springs, targets and the like) are be placed, so it's also possible to experiment to find out what works best, and why. Highly recommended.

Alex Kidman

Rating	****
	RAM, 4x CD-ROM drive
Requires	Pentium 75, Windows 95, 16M
■ Price	\$49.95
Phone	(02) 9552 8700
■ Distributor	Roadshow Interactive
■ Publisher	DK Multimedia

Dr Feelgood Hosts Sex

Have you ever walked into a shop and felt that, despite an enticing window display, all the goods were just a little bit downmarket and near their use-by date? That's how this CD-ROM makes you feel.

Based on the Channel Nine program and the Dr Feelgood radio series, the CD promises "aspects of sexual health we all want to know about". In practice, it makes extensive use of talking heads discussing hard to recognise fleshy parts, pink rubbery things, and soft-focus rustling sheets. So for the real smut-meisters, it's a bit of a letdown.

The initial menu allows the would-be sex expert to choose from a variety of sexual practice, woes, anticipations and associated plumbing advice. All have sub-sections, but in some, the legal eagles have obviously rattled their asexual sabres and cried 'no', because although the narration is there, the window which should contain images of throbbing dermis is a disappointing black. Censored, and without even a still image to salve the loss.

Similarly, some of the sections, such as the one on 'butt-plugs', are treated with demeaning humour rather than useful advice. Another minor fault is that the material comes from TV or

Interactive News

MP3 (MPEG Audio Layer-3) music files have been around for a while now, and though it has become the format of choice for 'music pirates' online, there are also many more legitimate uses. Web portal Lycos has jumped upon the MP3 bandwagon recently, and in a joint venture with Norwegian download site FAST will be offering a specially tailored search engine for MP3 files. The music industry still has concerns about the proliferation of MP3 files and the opportunities this presents for copyright violation, but it seems that more large companies are beginning to embrace the standard.

n related news, a confusing announcement was made recently concerning the release of the new 'MP4' standard. In Australia, a joint venture between OzEmail and online music store CMM announced the release of MP4 audio

tracks through a partnership with US company Global Music Online (GMO). On CMM's Web site (at http://www.cmm .com.au/mp4/), users can download a small number of files from a selection of popular artists, with no external player or software required to listen. However, all is not quite as it seems. GMO has merely licensed the a2b music format and combined this with an executable file. dubbing the result 'MP4 files' - which are not compatible with MPEG 4 Audio. Nevertheless, it seems that many are assuming that this format is the successor to MP3 (including some media analysts), and there has been a backlash over the 'misrepresentation'. CMM doesn't seem concerned, however, as its main page states that "as far as we're concerned this just means more exposure for all the excellent Oz music involved".

Oh dear - a new DVD venture, Fire

Horse Entertainment, has been launched in the US, with the aim of making use of new media such as so-called 'interactive DVD entertainment titles' to target a female audience. "[Our] titles combine dramatic content and immersive interactivity with the realism and video quality that only DVD can provide," said producer Gillian Bonner, Immersive interactivity, eh? Wonder what that means . . . "Unlike regular TV where commercials are forced on you, our format allows the viewer to see only commercials for products she's interested in and then she can purchase them right there and then, no waiting!". Combining the best of interactivity with a progressive and enlightened view on gender in the 1990s, look out for Fire Horse Entertainment coming to a store near you. Hopefully never!

Gareth Jones



radio and doesn't really suit the CD-ROM format.

There are one or two areas which might be of use to the sexual novice, and the advice on STDs is easy to access and helpful. Compared to the excellent Dorling Kindersley Ultimate Sex Guide, however, it is decidedly flaccid in both content and presentation. Overall, it would be unlikely to either stimulate or elucidate sexual prowess in anyone confident enough to walk into a shop and buy it.

Jeremy Torr

■ Publisher	Sprint Software
■ Distributor	Sprint Software
■ Phone	(03) 9427 9996
■ Price	\$29.95
■ Requires	486, Windows 95/98, 8M RAM,
	CD-ROM drive, SVGA
■ Rating	**

Madeline 1st and 2nd Grade Reading Deluxe

Madeline 1st and 2nd Grade Reading, released to coincide with the motion picture, presents the popular character of the books and TV show in two CD-ROMs designed to appeal particularly to young girls.

Each disc contains eight activities in which Madeline guides and encourages the school beginner to have fun reading. On the first disc, several games can be used to reinforce the beginning, middle and ending letter sounds, rhyming and compound words that are usually learnt at this age. Spelling accuracy is developed in a crossword game by matching pictures to given letters, and a scrapbook activity increases vocabulary through a labelling exercise of both objects and concepts. Listening to clues and deductive reasoning must be used to find



Pepito, Madeline's hidden friend, and sentence writing is encouraged as children choose ridiculous answers for Lord Cucuface to give via the teleprompter. Cards and invitations can be created using a choice of pictures, decoration and words or by typing in text.

Disc two contains most of the same games but at a higher skill level, and there is a focus on letter blends, synonyms and antonyms. Activities include comprehension through simple stories and questions, an alphabetising game, and learning parts of speech with the help of colour coding.

Madeline 1st and 2nd Grade Reading has great charm, beautiful production and is very easy to use. Each activity is cleverly self-correcting with a reward for success. The three levels of skill in every activity mean the product grows with the child or can be used by different ages. The individual progress charts and printable certificates would be useful both at home and at school. Terrific value for money.

Catherine Howard

■ Publisher	The Learning Company
■ Distributor	Roadshow Interactive
■ Phone	(02) 9552 8700
■ Price	\$49.95
■ Requires	486/66, Windows 95/98, 16M
	RAM, 2x CD-ROM drive, Sound
	Blaster or compatible.
m Potino	4444

Survey

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Box 2650, Sydney, NSW 1171
fax: (02) 8266 9999.



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Sex: □ Male □ Female
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Income before tax:
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25,000 — 34,999
□ 35,000 — 49,999
50,000 — 74,999 75,000 — 99,999
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a D b D c D d D e D News Roundup and Analysis a D b D c D d D e D First Take a D b D c D d D e D Editorial a D b D c D d D e D Reader's Say a D b D c D d D e D Two Bits (opinion columns) a D b D c D d D e D Price Watch a D b D c D d D e D Readers' Say a D b D c D d D e D Service and Reliability

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After Hours	□ Email	Servers Intranet/extranet
After Hours	☐ Intranet/extranet	☐ Monitors ☐ Web development
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hours	a □ b □ c □ Employment	
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□ yes □ no	☐ Trainer	question will be awarded the prizes. Chance plays no
	□ Reseller	part in selecting the winners. No responsibility is accepted for late, lost or misdirected mail. All entries
7. Internet use	□ Educator	become the property of ACP Publishing Pty Ltd, the
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□ yes □ no		of one Brother MFC-7160C valued at \$1,099, and 10
E W. L.		subscriptions to APC magazine, valued at \$65 each.
b. If yes, how often would you access the	11. What is your job title/position?	The prizes are not transferable or redeemable for cash. Any change in the value of the prizes occurring
Internet?		between the publishing date and the date the prizes
☐ Several times a day ☐ Daily		are claimed is not the responsibility of the promoter. 4. Prize winners will be notified by mail and their
a Daily		names will be published in the July 1999 issue of APC.

You can be creative or destructive with this selection, take your pick.

Movement of the people

Oddworld: Abe's Exoddus

Abe the Mudokon is back - and he's still a little flatulent.

A sequel to Abe's Oddysee was inevitable given its immense success, and as would be expected, there are more than a few similarities between this latest title and its predecessor. The same flickscreen action is here, as well as the same gamespeak, animation and tumbling off cliffs towards sticky (and yet somehow comical) ends. However, when the original game is as good as Abe's Oddysee, it is not a bad thing. True, it's not as original as it was, but it's still good.

The despicable Glukkons are also back, and this time they're making brew - Soulstorm brew, a potent concoction made from Mudokon bones and tears. Abe finds this out and must spring into action, jumping, climbing, solving puzzles and rescuing Mudokons on his way.

This is pretty much the same as the original game, but there are a number of improvements, the most significant of which is the added influence of gamespeak. In the original, speech was mostly a case of 'Hello. Follow Me'. In Abe's Exoddus, other Mudokons can express their anger and depression, or they can be downright giggly. A quick slap, an apology, and you're on your way. It's also now possible to talk to many Mudokons at once, which leads to more involved puzzles and larger rescues.

It's worth noting that Abe's Oddysee is now available as a budget title, so if you've never played Oddworld, it's a cheap starting point for Exoddus. For



those who can't get enough of Abe, the latest incarnation is excellent.

Alex Kidman

■ Distributor	GT Interactive
■ Phone	(02) 9902 3000
■ Online	http://www.oddworld.com/
m Price	\$69.95
■ Requires	Pentium 133, 16M RAM, 4x
	CD-ROM drive
■ Classification	M
■ Rating	****

Microsoft Combat Flight Simulator: WWII Europe Series

You are in a dogfight high in the skies during WWII. 'Bandits. Nine o'clock. Low,' screams from your headset. You bank hard right, and push down the nose of your temperamental Supermarine Spitfire, forcing it into a steep dive. The engine pitch changes as you soar towards your target — four German Heinkel bombers. You squint blindly into the sun in anticipation of the supporting Messerschmitt fighters. This is London, during the height of the Blitz.

Microsoft Combat Flight Simulator (MCFS) places you in the hot seat of a WWII fighter plane flying in some of the most famous air battles in history. It continues the realistic flight model of previous Microsoft flight simulators, but adds the excitement of air combat. You can fly one of eight historic fighters from the airforces of England, Germany and the US.

The attention to realism makes this a

successful package. Each plane displays different performance characteristics which supposedly equate to the physics of the real thing. The campaigns are based on historical events from the Battle of Britain and the Battle Over Europe. The settings are rendered in detail, so you can dogfight over famous landmarks.

Choose to fly single missions or enter campaigns where you are briefed on which missions to fly. As you progress through a campaign, you can earn medals



and promotions. MCFS also includes a Quick Combat mode - placing you in the middle of the action.

The comprehensive 220-page manual is the bible for playing the game, and it features a flight school that teaches the basics of flight. But it is the Air Combat section where you will need to pay the most attention. It is important to learn the manoeuvres so you can outperform the enemy in the heat of battle. The manual also has detailed information on all the aircraft, as well as some interesting background history of war in the skies during WWII.

As with other Microsoft flight sims, you can import scenery and aircraft from the Internet to customise MCFS, and there's a multiplayer option so you can dogfight with your friends.

Andrew Broadhead

■ Distributor	Microsoft
■ Phone	132 058
Online	http://www.microsoft.com/
	games/combatfs/
■ Price	\$89; \$20 cashback for existing
	Flight Simulator owners
■ Requires	Pentium 133, 16M RAM
■ Classification	G 8+
■ Rating	****

Lego Creator

Anyone who has ever trodden barefoot on a piece of Lego left lying around the living room floor and then hopped around cursing in agony will appreciate the idea of a virtual Lego set that will leave your big toes free from danger. Lego Creator (one of a number of new 194 AFTER HOURS/APRIL 1999 G A M E Z O N E



diversions into the software market by the famed Danish toy manufacturer) aims to replicate the experience of building Lego models without the inconvenience of the dog eating your creations or running out of those crucial bricks just before you finish building a 10-storey skyscraper.

Lego Creator can't offer the tactile experience of handling the actual bricks, but it makes up for this by taking advantage of your PC's multimedia capabilities. Lego figures come to life with predefined actions; anything with wheels begins to move in 'play' mode; police sirens wail; and there are even exploding bricks if you have a destructive urge. (There's also a real Lego figure, Biker Bob, included in the package for the determinedly physical.)

The interface is simple and consistent, and the recommended age range of 'eight years and up' is about right. The built-in tutorials are particularly good, and there's a range of prebuilt worlds you can experiment with.

Lego Creator's biggest audience may well come not from the pre-teen set but from nostalgic adults (like this reviewer) who want to relive the playthings of their childhood without actually having to clean up afterwards. Whatever the audience, there's plenty to keep you entertained for hours.

Angus Kidman

■Distributor	Roadshow Interactive
■Phone	(02) 9552 8700
■Online	http://www.lego.com/
■ Price	\$79.95
■ Requires	Pentium 166, Windows 95, 32M
	RAM, 6x CD-ROM drive
■ Classification	N/A
Rating	***

For reviews of Lego Chess and Lego Loco, check into our Web site at http://apcmag.com/gamezone/lego/.

Starsiege: Tribes

Buy this. Buy this. Buy this. Got the message?

If you're a fan of multiplayer online games, or even if you just like the sound of them, this is the one to get. Even though it sat unclaimed on a pile of review games in the APC office for a couple of weeks (nobody had heard of it), once it was installed a wave of Tribes addiction swept the office.

Starsiege: Tribes is a first-person shooter with Quake-style controls, but it's set outdoors with jet-packs, vehicles and fortified bases. There is no singleplayer game, apart from some simple training missions. Via the Internet (or on a LAN), up to 32 players (more if everyone has a very fast machine, such as a Pentium II or Celeron with a Voodoo2) can take part in vast, frenetic battles to control or destroy objectives, capture the enemy's flag, or just duke it out. A huge variety of equipment is available and strategy is key - to win, players must share attack, defence and command roles. Connect to a server

with a low ping time, and it performs like a dream.

If you've played the excellent Team Fortress add-on for Quake, you'll have some idea of what's involved — but the consensus among diehard Team Fortress fanatics who've played Tribes is that Team Fortress is dead. Tribes has more depth, better maps, and even voice samples that you can use to bark orders or exclamations ("Shazbot!"). Unfortunately, there isn't one for "Wow, this game rocks!", but that's something you'll often see players type instead.



Games News

Talk of trouble at development house Ion Storm has been going on for quite a while now. But the recent publication of an indepth feature about Ion Storm board members in a Dallas, Texas newspaper has blown the story into orbit. If you haven't already, go to http://www.dallasobserver.com/1999/011499/feature1-1.html to read the whole thing yourself. It's a great insight into what can happen when egos get out of control and boardroom manoeuvring (and greediness) become more important than the actual production of games. In a move that surprised nobody, Ion Storm quickly filed a lawsuit against the paper in an attempt to have the author, Christine Biederman, disclose where she obtained the extremely damaging lon Storm internal emails, but their chances seem slim. It used to be about the games, but in these days of mega-million-dollar publishing deals and where big businesses are making moves capitalising on the popularity of computer games, don't expect this to be the only instance of development companies falling apart through in-fighting, deception, paranoia and greed. My prediction is that this is really only the tip of the iceberg, and

probably quite tame compared to what's going to follow in the next couple of years. Recently, the top-selling games for 1998 (in the US, at least) were announced by research firm PC Data. And the biggest seller wasn't one of the crappy Deer Hunter 'games' - yay! Instead, Blizzard Entertainment's Starcraft took out the number one spot. However, of the top 20 sellers, eight games would be classified as 'budget' releases, including titles like Big Game Hunter and Barbie Nail Designer. I shudder to think how the marketing people are going take these results. Lastly, if you were wondering just how advanced flight simulators have become, try this on for size. During the last fracas between US forces and Iraq, NBC decided to use Jane's Fleet Command to re-enact some of the 'Desert Fox' raids for their viewers. Various maps and 3D object models (fighter planes, missiles, ground forces, and so on) were used to demonstrate what was happening, and NBC was said to have been very

impressed with the results, and would

consider repeating the process for future

conflicts.

Gamespy

There's quite a learning curve involved, but a thorough reading of the manual and a run through the training missions will cut your initial confusion. Soon you will be piloting an armoured personnel carrier onto the roof of an opposing base or leading a raid on the enemy's power generator, while your teammates snipe at the guards from nearby hills.

What the hell, let's just say it - this is one of the best games ever made. Tell the folks you won't be home for dinner.

Simon Vandore

Distributor	Wolf Interactive
■ Phone	(02) 9417 9600
■ Online	http://www.tribesplayers.com/
■ Price	\$89.95
Requires	Pentium 200 (or Pentium 166 with 3Dfx card), Windows 95/98/NT, 16M RAM, 150M hard disk space, 2x CD-ROM drive, Net connection
■ Classification	M 15+
Rating	****

Baldur's Gate

It was easily last year's most anticipated RPG, but Baldur's Gate only arrived on our store shelves early this year. After the immense hype surrounding the release of what was meant to be the most faithful reproduction of the AD&D roleplaying system to date, Baldur's Gate had to achieve a lot to avoid disappointment. Fortunately, it did.

Baldur's Gate follows the journey of an orphan of mysterious parentage (you), from the library of Candlekeep to the city of Baldur's Gate in the western part of the AD&D world of Toril. The story builds very well throughout the game. It is divided into seven chapters and each has goals that you must achieve before you can move on. In between, there are a



huge number of side-quests for you to role-play and bash your way through.

Aside from the central character, up to five other characters can join the party. Here comes the really cool part: these extra characters can be controlled by other players across a network, for a true role-playing experience. Characters don't even have to stay in the same screen, they can roam on their own for a certain distance. So while a group of players wander around some shops, a player who is a

thief can be out robbing houses in the area.

Baldur's Gate uses a Diablo-esque isometric viewpoint which is very well handled, although pathfinding can be a bit buggy. The area to explore is huge, although a lot of it is wilderness, every area is pre-rendered and unique. You aren't even required to explore most of it, and a large number of the side-quests are purely optional (and require you to roleplay your character's ethos).

Combat is controlled by editable scripts, but the action can be paused and minutely controlled if desired. Monsters are finely drawn and spells are truly spectacular.

The game is not without its petty annoyances — the disk swapping between the five CDs (DVD anyone?), time spent wandering in random wilderness, and the relative shortness of the central plot. Overall, though, it is one of the best RPGs ever to grace store shelves. It's definitely up there with Interplay's other recent RPG, the outstanding Fallout 2.

Nathan Taylor

Distributor	Roadshow Interactive
■ Phone	(02) 9552 8600
■ Online	http://www.blackisle.com/
■ Price	\$89.95
■ Requires	Pentium 166, Windows 95,
	16M RAM, 4x CD-ROM drive
■ Classification	M 15+
■ Rating	****

Return to Krondor

The sequel to Betrayal at Krondor is also set in Raymond Feist's highly derivative Midkemia, a world of - exactly as you'd expect - elves, dwarves and dragons alongside the usual thieves, rangers and so on.

In Return to Krondor plot is everything, and as such, it works best as an interactive adventure rather than a com-



plete role-playing game. Viewed from a third-person perspective, your party starts out small and grows in a distinctly linear fashion. In terms of options, you can switch to a more combat-oriented game, but you're still essentially stuck in a single, long-term mission — there's none of the side-quests that usually make or break most RPGs.

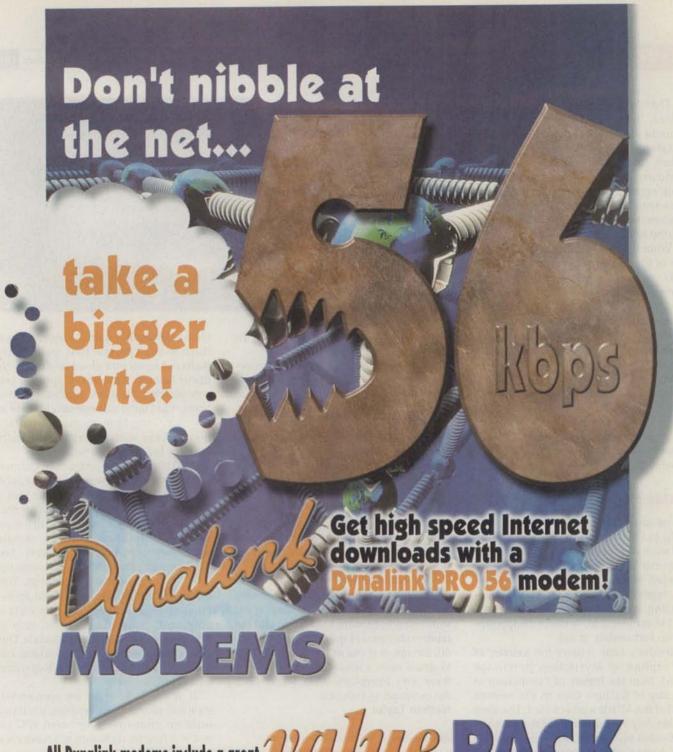
All this would be extremely uninteresting if the rest of the package was poor, but for the most part it isn't. The plot is mostly engaging, and the whole graphic approach is appealing, from the fluid combat animations to the simple mouse/keyboard-based movement. The third-person perspective is reviewed via the use of pre-rendered backdrops. This unfortunately leads to some odd movement choices, as you can step onto a pavement that spans the view, only to find you can't actually walk along it. This extends to combat, where working out attack options and ranges can sometimes be a little confusing.

If you're looking for an open-endedstyle role-player look elsewhere, but if you want an immersive story-based RPG (or you're a Fiest freak) Return to Krondor is a reasonable buy.

Alex Kidman

■ Distributor	Dataflow
Phone	(02) 9417 9700
■ Online	http://www.sierrastudios.com/
■ Price	\$79.95
■ Requires	Pentium 166, 24M RAM, 4x CD-
	ROM drive
■ Classification	G
Rating	***

You can find more game reviews this month — including two titles in the Lego series — at http://apcmag.com/ gamezone/.



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Some museums have leapt into the Internet void — exhibits and all.

The classic collector

Classic Home Video Games Museum

Games consoles hit the scene in 1972 when the Odyssey system was released. Odyssey used transparent plastic screen overlays in lieu of real graphics, and wasn't a resounding success.

Three years later, Pong arrived and things changed forever. Now it's difficult to see the attraction of batting a crude ball back and forth between two bars of white light, but back then, this stuff was groundbreaking. Games consoles really hit critical mass in the early 1980s, riding shotgun with the growing personal computing revolution, and increasing awareness of computers and games in the popular press. Movies like 'Electric Dreams', 'Tron' and 'WarGames' all capitalised on the growing market for video games and computers.

The early 1990s were also notable for the collapse of the video game market, which followed market saturation of poor quality games and consoles. Shortly afterwards, the market recovered and consoles like the Sony PlayStation have become wildly popular today.

There are, not surprisingly, more than a few sites devoted to classic games consoles. Most of them are enthusiastic but amateurish efforts that aren't really worth revisiting. The Classic Home Video Games Museum makes the grade because it: a) looks like more than five minutes was spent designing the site; b) has pictures and descriptions of old games consoles; and c) is updated on a fairly regular basis.



In a perfect world, a site like this would offer downloads, ROMs (soft electronic replicas of the physical ROM chips inside the game cartridges), and a wide range of emulators to suit your hardware. This site doesn't, but that is because ROMs tend to be protected by copyright and emulation is a legal grey area.

It's unfortunate that copyright holders are predisposed against ROMs being made available online - often the owners have no real interest in the game itself, or its relevance to gaming history. They are interested in making money, and because it's difficult to cash in on obsolete technology, they resort instead to issuing nasty legal letters.

In any case, the comprehensive links page should be an adequate starting place for people who want to find this illegal stuff online. It's not that hard. If you want to keep it legal, the museum includes a short article outlining how and where old games and consoles can be purchased, and includes some links to games dealers.

The most bizarre section of the site is the readers' stories. Think of Penthouse Forum without the sex and devoted to games consoles, and you're on the right track. It's truly strange, and illustrates just how weird some people are.

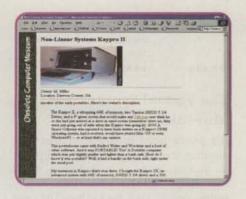
Josh Gliddon

Online	http://ns2.apmtech.com/
	dbrown/museum/
Rating	****

Obsolete Computer Museum

The history of computing is largely a study in planned obsolescence, as the Y2K problem well illustrates. The boffins screwing together mainframes with funky names like the IBM System 300 didn't expect them to be in use several decades later. The problem is, they are still in use, which is either a tribute to the boffins' engineering prowess, or indicative of their shortsightedness.

But planned obsolescence "or technological progress, whichever way you want to view it" doesn't instantly make old products useless, as collectors of everything from old cars to valve amplifiers will attest.



Old computers also have a use, even if it's only to collectors, who value their novel technical solutions, the nostalgia associated with a CP/M command line, or the often bizarre cases they came in. The Obsolete Computer Museum is dedicated to preserving the memory of these machines, and the memories of those who still hold them dear.

The most attractive feature of online museums is their easy accessibility. Visiting one doesn't require any travel and they're open 24 hours a day. The downside is that there's often very little interaction, and the pictures often don't do justice to the exhibits.

The Obsolete Computer Museum has both these positive and negative qualities in truckloads. Its host server is reasonably fast, but the quality of the pictures varies. There are lots of computers listed, but the information relies on those who contribute it, so it is not always comprehensive, and, as some of the revisions demonstrate, it isn't always accurate. It's also very static - months often pass between updates. All these factors combine to make the museum a place that you'll visit once, spend a long time reminiscing, and not go back to for months on end. But isn't that exactly what you'd do with a physical museum? How often do vou visit the National Gallery or the Powerhouse Museum?

Of the 150 computers on exhibit, some are familiar and others make you wonder how they ever made it to market, let alone sold in any quantity. Computers like the Mattel Aquarius, Otrona Attache and Morrow Decision I seemed doomed to failure simply by the ludicrousness of their names, while others, like the Apple

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Lisa, were a great idea at the wrong time (and wrong price bracket). But some of the computers listed, like the famous Tandy Model 100, are still in use today, because sometimes good technology just won't go away.

Josh Gliddon

■ Online	http://www.ncsc.dni.us/fun/
	user/tcc/cmuseum/cmuseum
	.htm
Rating	***

The Virtual Synthesizer Museum

It's pretty hard to argue against the assertion that analog is infinitely superior to digital. Take, for instance, vinyl recordings: infinite bandwidth, lovely warm sounds, cool packaging. The only things CDs have going for them are the psychedelic rainbow colours and portability.

So what could be better than a vinyl record played through a valve amplifier? A recording of an analog synthesiser in the same playback chain, of course! Analog synths got a bad name thanks to the excesses of 1970s prog rock bands like Yes and Genesis, and as a consequence, it was easy to pick up a Moog or even an Emu in pristine condition for next to nothing.

Those days are over thanks to the rehabilitative efforts of groups like the UK's Stereolab and the Swirlies, and vintage synths now command prices comparable to the vintage guitar market.

Although a Minimoog might be out of the price range of all but the most devoted, sites like the Virtual Synthesizer Museum make it possible to see and read about some of the most interesting electronic instruments ever made.

The site bases its exhibits on the collections held by several 'real' museums in the US, and while it's a bummer there's nothing similar in Australia, it's possible to have a vicarious experience via the site.



Surfbaud: Collectors tension

Buffalo Bill, the serial killer in 'Silence of the Lambs', 'collects' victims in order to create a suit made from human skin. Without delving too deeply into serialkiller psychoanalysis, the skin suit - a female suit — is, for Bill, aspirational. He wants to be a woman, he's been rejected from sex-change programs, and he compensates for this in a particularly gruesome manner.

Whether or not Bill would've put his collection on 'show' is open to conjecture; many collectors — be they art collectors, record collectors or car collectors - build their collections for purely private pleasure. A prime example of this is the rumoured

multimillion-dollar car collection kept in a climatecontrolled warehouse in the British Midlands: very few people have ever seen it, and those that have are required to sign nondisclosure agreements.

Virtual museums and Internet sites devoted to a particular topic are similar in both theme and execution. because they tend to be private ventures. Traditional museums, despite their Internet presence, tend not to create virtual replicas of themselves, perhaps out of fear of cannibalising the audiences that would otherwise make the trek to see the exhibits.

Virtual museums, personal Web sites, the growth of the Internet and increased interest in collections are also representative of a massive growth in premillennial angst. The Australian Financial Review Magazine recently identified (in part) this trend when it spoke to research organisation Pophouse as part of its 'Look Out!' feature in the February 1999 issue. According to Pophouse, the "meteroric rise in cinema attendance and use of computer games and the Internet all indicate a growing life-avoidance trend. For similar reasons, online religion and a passion for collectibles - collecting anything - will experience a surge of interest."

Surely, then, the only expression of this millennial angst that's more pure than an online museum or a personal collector page would be . . . a site devoted to the worship of Elvis Presley! There are, in fact, people that pray to Elvis — the authority on these matters, Woman's Day, once had a feature on people who had prayed to Elvis and had had their prayers answered. Others claim to have experienced visions

> of Elvis, or had Elvis appear to them in dreams. Sadly, the site that comes closest to meeting the needs of Elvis worshippers worldwide is devoted to selling Elvis astrology books. It's worth a visit, but the freak spotters out there

are going to be disappointed that it's not, well, more freaky.

The best place to search for online religion is Yahoo, which literally features piles of them. After you've tried Yahoo, head on over to AltaVista, which is also a dab hand at locating sites designed to fulfill the online spiritual needs of the pre-millennially tense. Better still, try starting your own religion, stash some supplies and a shotgun to ward off rabid Y2K crowds, and wait for Elvis to appear in a spaceship.

Hannibal Lecter

http://gladstone.uoregon.edu/~cory/ lecter/fag.html

Elvis is God

http://www.lifeintl.com/mag.html Josh Gliddon

In line with the best virtual museums, the Synthesizer Museum is relatively easy to navigate, and has lots of pictures and extensive reading material available. There are several interviews with analog synth luminaries, including one with Dr Joseph Paradiso, who's spent most of the last 20 years building a massive modular analog synth in his basement

The only aspect of the site that could use some work is the level of interaction. It would be good to be able to download sound files of different analog synths in action, as well as a couple of files that illustrate some of the different capabilities of the equipment (what is an envelope filter anyway?) Also, many of the pictures give an idea of what the synth looks like from a distance, but a couple of detail shots wouldn't go astray.

But those things are only minor quibbles, when compared to the overall quality and comprehensiveness of the site. Josh Gliddon

http://www.synthmuseum.com/

Online Rating

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April is the cruellest month, breeding lilacs out of the dead land . . . Chip Chat can be as cultured as the next person, you know.

Chip Chat

Export control

Did you realise that if you've surfed the Internet, you are now owned by the US government? No? Then consider this headline from a recent announcement issued by HP: 'Hewlett-Packard VerSecure receives US government approval to export more than 80 per cent of global Internet users'. We knew the US government had an effective control over domain names, but this is ridiculous. Although being under the control of the Australian government probably wouldn't be any more reassuring.

Link or swim

It seems the people at the White Pages Web site can't quite decide what's worth linking and what isn't. If you submit an email address as part of your entry, it appears online as a link, ready for the instant receipt of spam. If, however, you also submit a Web site address, it isn't linked. Very, very strange. Don't hold your breath waiting for the phone number to connect into your favourite dial-up software.

Ziggy-de-doo-dah

When news broke in late February that former Optus CEO Ziggy Switkoswki had scored the plum job of Telstra's head honcho, the burning question wasn't whether he had enough experience for the job, or if he knew any useful trade secrets from Optus. No, the race was on among the news writers of the land to see who could come up with the most punladen headline announcing his appointment.

Newswire went in hard and early with a Will Smith-flavoured 'Getting Ziggy with it: Telstra's new CEO'. IT News chose an older pop star reference in the form of 'Ziggy plays guitar at media circus'. AAP decided to play up the Optus angle with 'Ziggy says Yes to Telstra'. However, the collected wits of News Limited and Fairfax apparently decided the whole thing was just too hard, and were content with Cgrade phone gags such as 'Ziggy gets the call'. Pikers.

Sub-er hero

For the most part, sub-editors are the unsung workhorses of the magazine world, doing all the fiddly checking and hassling recalcitrant writers. So Chip Chat feels morally obliged to highlight the heroic actions of APC's chief sub, Kevin Pyle, who recently helped apprehend a burglar who had broken into the apartment of a sleeping woman on the floor below him. Kevin called the cops and then had to chase the thief through the building when he attempted to escape. Nothing this exciting ever happens to Chip Chat, so naturally we're thrilled.

Search engines: Fishy

As search engines continue to frantically transform themselves into portals/hubs/ the second coming, it's a wonder you can still use them to look up things. But we thought we'd try. There are at least a dozen sites in the world featuring the words 'Bill Gates' and 'anchovy'. The two words occur together in articles on talking appliances, online gaming logs and children's poetry. The last-named site offers this cure for acne: "Get peanut butter, passionfruit, spit from Bill Gates and the head of a fish caught and cooked by two men named Fred, mix it all together and eat it." We have no idea why.

Contest: Technology gag of the month

This month's gag is long and has been in circulation for a while, but is worth a read. It was submitted by Troy Cameron:

Drug dealers

Refer to their clients as 'users' "The first one's free!"

Have important South-East Asian connections (to help move the stuff)

Strange jargon (stick, rock, wrap, E, source, the pigs)

Realise there's tons of cash in the 14 to 25-year-old market

Clients love your stuff when it works, want to kill you when it doesn't

Job assisted by industry producing newer, more potent product

Often seen with pimps, hustlers and low-life

When things go wrong, a 'fix' is just a phone call away but may be expensive

A lot of successful people get rich in this industry while still teenagers

Do your job well and you can sleep with sexy movie stars who depend on you

Software developers

Refer to their clients as 'users' "Download a free trial version"

Have important South-East Asian connections (to help debug the code)

Strange jargon (SCSI, RTFM, packet, source, Microsoft)

Realise there's tons of cash in the 14 to 25-year-old market

Clients love your stuff when it works, want to kill you when it doesn't

Job assisted by industry producing newer, more potent product

Often seen with marketing people, venture capitalists and fund managers

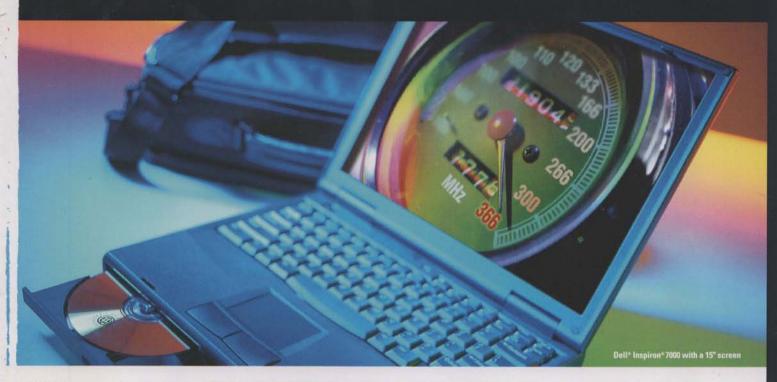
When things go wrong, a 'fix' is just a phone call away but may be expensive

A lot of successful people get rich in this industry while still teenagers

Damn! Damn! DAMN!.

We'll be sending Troy an Ericsson water bottle and a copy of the game Sub Culture, so there. You too can be draped in back page glory. Send your technology jokes the shorter and funnier the better—to chipchat@acp.com.au. If we publish your joke, you'll win a specially selected item from the APC prize cupboard.

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